Labor market institutions in OECD countries

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Labor Market Institutions in OECD Countries: Origins and Consequences

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PROEFSCHRIFT

ter verkrijging van de graad van doctor aan de Universiteit van Tilburg, op gezag van de rector magnificus, prof.dr. F.A. van der Duyn Schouten, in het openbaar te verdedigen ten overstaan van een door het college voor promoties aangewezen commissie in de aula van de Universiteit op

vrijdag 17 januari 2002 om 14.15 uur

door

Michèle Valérie Karine Belot,

geboren op 25 mei 1976 te Brussel, België

PROMOTOR: Prof. Dr. Ir. Jan C. van Ours

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Time has come for me to close the Chapter of my Ph.D. in Tilburg. You now have in your hands the fruit of four years of work… This is scary as I fear that you will all immediately see the imperfections. There is never a good time to finish your dissertation as you endlessly see ways of improvement. But at one point in time, you have to let it go and hope for the best.

In 1997, I came to Tilburg as an exchange student for four months. I stayed for five years. I learned Dutch, acquired an agenda and started making plans. My life completely changed. However there are things I will never get used to: the milk at lunch, the "erwtensoep" and the caravans. Except for that, I feel quite well integrated.

My experience in Tilburg not only increased my knowledge in economics but constitutes an incredible human experience. Some believe that the life of a Ph.D. student consists mainly of his/her Ph.D., with nothing very exciting happening on the side. Well, my experience based on the fifth floor tells that it is absolutely not true! Sometimes I felt like in the middle of a soap opera. The turbulences were sometimes hard to handle. This said, I would like to devote this foreword to the people who supported me all the way. I met here very special people, whose friendship and care were precious gifts for which I could never thank them enough.

First of all, I would like to thank my supervisor Professor Jan van Ours. I think he is the ideal supervisor. Not only he is an outstanding researcher but he is also a very nice person. I always had the feeling he cared not only about my work but also about me. And this despite the fact that I always refused to join the "jogging-group"… Jan introduced me to the best people in the field, encouraged me to participate to conferences and to stay for a while at an American University. Hence, I had the great honor of being supervised for three months by Professor Dale Mortensen at Northwestern University, who I would also like to thank a lot for his time, guidance and kindness. I am very flattered by his presence in the committee, which I could call a dream committee. I would also therefore like to thank Professors Bovenberg, Van Damme, Teulings and Doctor Boone for being part of it.

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Next to this stimulating scientific community, I had family and friends on my side. My parents have always been behind my choices and helped me a lot going through these last four years. "Merci Papa et Mama". When you grow up, you always hope to find

somebody that will give you this same warm feeling as the one you experience when you are at home. And I met this person here in Tilburg. Jeroen was not only a great colleague, who read and criticized all my papers but also a precious partner in life.

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Closing the door to this part of my life is a hard thing to do but the transition is smooth as my new working environment is very pleasant. I am currently working at the department of Education and Sciences at the Netherlands Bureau of Economic Policy Analysis and I believe that some fruitful research should come out of our collaboration.

Michele, January 2003

Contents

Chapter 1

Introduction

This dissertation contributes to the large and solid pillar of labor economics. In a society where work is considered as one of the most important component of life, it is not surprising to see that scientists, politicians and "the man of the street" are all concerned with the performance of the labor market. This introductory Chapter presents first the main questions addressed in this manuscript (Section 1.1), second, the building blocks or background behind each chapter (Section 1.2) and, third, a summary of each chapter revealing the most important conclusions (Section 1.3).

1.1 Motivation and questions

The oil shocks in the seventies severely hit the economies and in particular, the labor markets, in the developed world. However the United States and to some extent other Anglo-Saxon countries recovered faster than most European countries. The literature opened the debate opposing the flexible United States to the "institutionally rigid" European countries. Although it is not so obvious what actually hides behind these rather vague concepts, there has now been a long tradition of believing that there were important regulations present in most European countries that slowed down the adjustment process on the labor market after the oil shocks. Friedman (1968) offers probably one of

the earliest traces of an assessment of a theoretical role of "institutional arrangements" on the equilibrium rate of unemployment, stating that the natural rate of unemployment is

> "the level which would ground out by the Walrasian system of general equilibrium equations, provided that there is embedded in them the actual characteristics of the labor and commodity markets, including labor market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availibilities, the costs of mobility and so on."

The concept of *natural rate of unemployment* has been the subject of a lot of discussions. Without entering into the details, the literature usually assumes that the natural or structural unemployment rate depends on essential and institutional characteristics of the economies.

The role of labor market rigidities has been widely studied, both theoretically and empirically. A nice overview is given by Nickell and Layard (1999) in their chapter of the *Handbook of Labor Economics*.

It is of course very difficult to give an operational definition of the labor market institutions which would have played a significant role in distinguishing the European and American histories in terms of labor market performance. The ones that are usually considered in the literature are regulations that do influence more or less directly the functioning of the labor market. Hence, there has been interest in the taxes levied on labor, in labor standards and employment protection legislation, in the trade unions, in the wage bargaining system, in the minimum wage(s), in the benefit systems, in the "active" labor market policies, in education policies and in barriers to geographical mobility. The choice is of course to some extent arbitrary as some of these institutions concern also people who are not in the labor force (such as the tax system) and other regulations are

not mentioned here although they may play a role in the labor market (such as product market regulations, etc.)

The unemployment rate was a major source of concern in most European countries and reforms have been implemented almost everywhere at different scales. Some countries started to intrigue scientists as their unemployment ratse were quite low, although they were classified as "rigid" countries. The first striking example is of some Nordic countries (as Norway). Later, the Netherlands, Denmark, Ireland and New Zealand also succeeded in reducing their unemployment rates significantly, raising new questions with respect to the role of labor market institutions. Furthermore, the blame of some institutions has been questioned. The best example is probably the one of the employment protection legislation (EPL), that is much more present in European labor markets than in the US. EPL is usually defined as the set of regulations that makes it harder for a firm to get rid of its workers. This particular institution is probably one of the most challenging to study. The reason is twofold. First, indicators measuring its intensity are somewhat unsatisfying and, second, theories predict that its effect on the stocks of the labor market (such as the unemployment rate) is ambiguous. The most common reason advanced for that is the negative role employment protection plays both on job destruction and job creation. The idea is that employment protection discourages firings but also hirings (since firms cannot easily get rid of their lowest productive workers in bad times). EPL slows down the reallocation from bad productive places to good ones. It also gives workers some insider power in the bargaining of wages and, by definition, protects their jobs against negative shocks. EPL differs a lot across countries. Given that it does not have a clear effect on the labor market stocks but that it does seem to affect negatively labor market flows, an interesting question is why some countries have a strict EPL while other (in particular Anglo-Saxon countries) have a much more flexible regulation. Furthermore, a lot of countries ranged in the "strict" category have implemented reforms towards more flexibility, but these reforms often miss political support. More than ever it

seems necessary to understand the political forces behind this institution and the benefits and costs associated with its preservation. The largest part of this thesis is therefore devoted to the study of employment protection. The other institutions deserve as much attention but the literature already provides a lot of answers regarding the effects of and political forces behind labor taxes, unions and unemployment benefits. Some uncertainties persist with respect to the employment protection legislation, in particular concerning its *raison d'être.*

Given the developments in unemployment rates and institutional reforms, the following questions deserve attention:

- What is precisely the effect of labor market institutions on the unemployment rate?

And two questions directly related to the employment protection legislation:

- Can we explain the political support for employment protection legislation in European countries, as opposed to the US?

- Does employment protection legislation make sense, from a welfare point of view?

This manuscript provides some answers. The first question is addressed in **Chapter 2**. The originality of this chapter is that it considers the effects of institutions as dependent on each other, i.e. it shows that the effect of an institution depends on the rest of the institutional framework. The argument is supported by an empirical analysis based on the experience of OECD countries.

Chapter 3 proposes an answer to the second question. It argues that the reason why the United States prefer a lower level of EPL than most European countries lies in essential characteristics such as the size of the country and the (low) migration costs that increase the opportunities for profitable labor reallocation and reduce the need for income and employment protection.

Finally, the last question is treated in **Chapters 4 and 5**. Both chapters show that employment protection makes sense if one considers investments into human capital either prior to the entry into the labor market (Chapter 4) or on-the-job (Chapter 5).

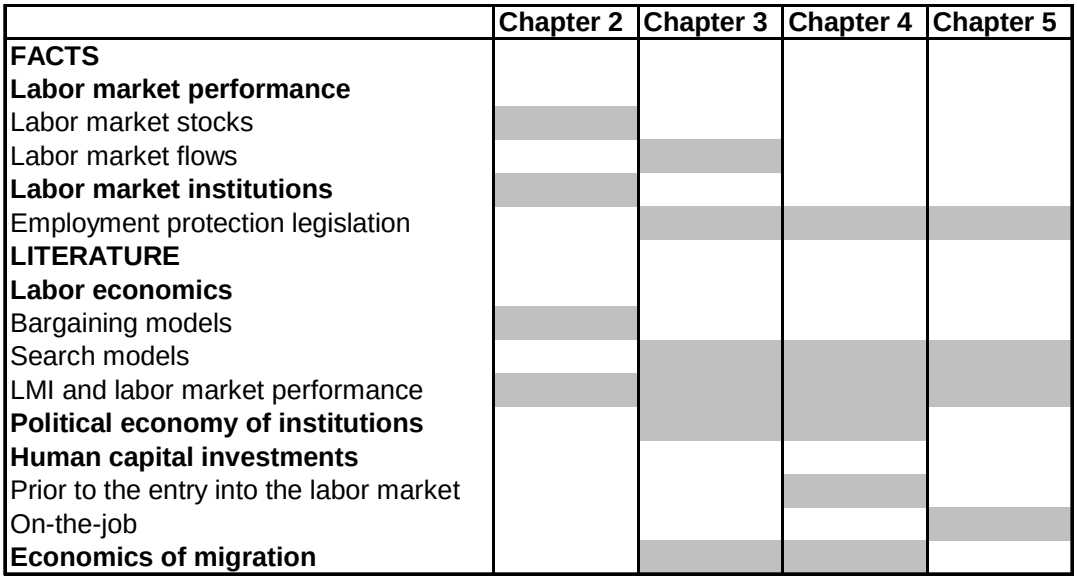

Figure 1.1: Overview of the building blocks

1.2 The building blocks

This dissertation uses important theories, methods and facts of the literature in labor economics. Figure 1.1 presents an overview of the building blocks of the various chapters. First, this dissertation is inspired by facts observed in OECD countries, regarding labor market performance and labor market institutions. Second, it leans against the wide literature in labor economics and other economic fields which are more or less related to labor. Hence, it is inspired by the well-established literature on the political economy of various institutions, and by theories on human capital investments. Similarly, it is built on theories of the economics of migration, which are concerned with the determinants of migration, that are often labor-related but do not have to. This section gives a flavour of what one can find inside of each of these building blocks.

1.2.1 Labor Market Performance in OECD Countries

Keeping aside normative considerations, a labor market is usually evaluated as well performing in reference to several key indicators. The first part presents indicators relative to labor market *stocks* and the second part indicators relative to labor market *flows.*

Labor market stocks

The OECD (1994) proposes a collection of facts underlying their "diagnosis" of the labor market performance of the OECD countries. Indicators can be refined almost to infinity. The most important and relevant aspects of labor market developments in OECD countries are presented here.

The first graph presented in the OECD Jobs Study relates to the unemployment rates, suggesting a "structural" change after the two oil shocks in 1974 and 1979. The unemployment rate probably attracts the most attention because it is the least voluntary of all states in the labor market. It is often the indicator looked at when labor market policies are implemented. This is the reason why the empirical analysis, in Chapter 2, focuses on the unemployment rate as indicator of the labor market performance. Three types of unemployment histories can be distinguished (see Figures 1.2, 1.3 and 1.4). First, we have the countries which have not been significantly affected by the oil shocks such as the United States, Japan, Norway, Switzerland and to some extent Canada. Then we have countries that have experienced a continuously rising unemployment rate since the mid-seventies such as Austria, Belgium, France, Germany, Italy and Sweden. Then we have some countries which did experience a rise in their unemployment rate after the oil shocks but then succeeded in reducing it significantly, such as Denmark, Ireland, Finland, New Zealand, the Netherlands and the United Kingdom. Beyond this general indicator, some refined measures of unemployment capture the attention. Indeed, unemployment is far from being equally spread across the population. Hence, significant differences are observed between genders, age groups, educational groups and occupations. The theory of

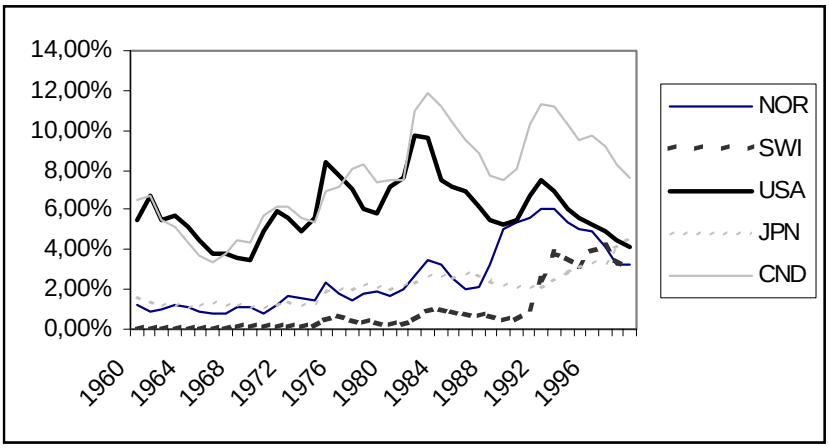

Figure 1.2: Unemployment rates in OECD countries (1)

skill-biased technological change argues that the demand for high-skilled workers increased a lot over time relatively to the demand for low-skilled workers. Of course, there has been in the same time an increase in the average educational attainment, meaning that the supply of high-skilled workers also increased relatively. However, one usually observes that low-skilled workers experience higher unemployment rates, and this disadvantage has grown over time, suggesting that the demand effect dominated the supply effect. The OECD (1994) shows that the ratio of the unemployment rate for workers with lower secondary diploma or less and the unemployment rate for workers with upper secondary or higher education diploma has increased over time.

Besides the unemployment figures, other indicators of labor market performance deserve some attention. The participation rate is one of them. The reason why participation rates are used as a measure of labor market performance is because they reflect to some extent the labor supply. It is not a perfect measure as discouraged workers may drop out of the labor force when times are bad but would re-enter as soon as the prospects are better. This said, the evolution of participation rates is also characterized by substantial changes over time and there are important differences across countries. A common

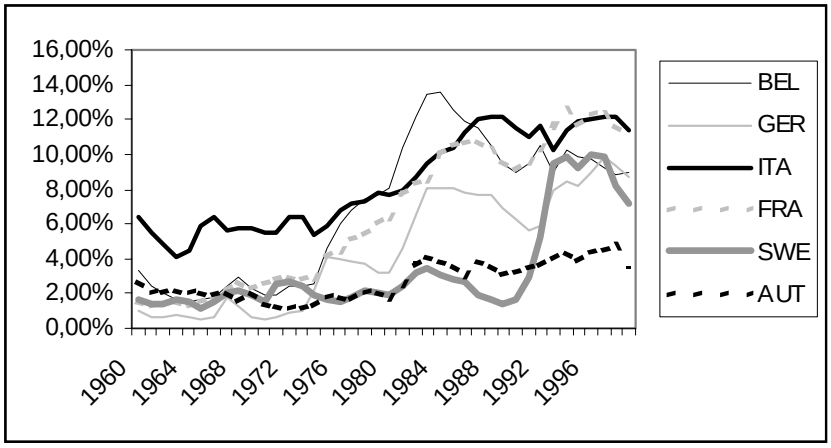

Figure 1.3: Unemployment rates in OECD countries (2)

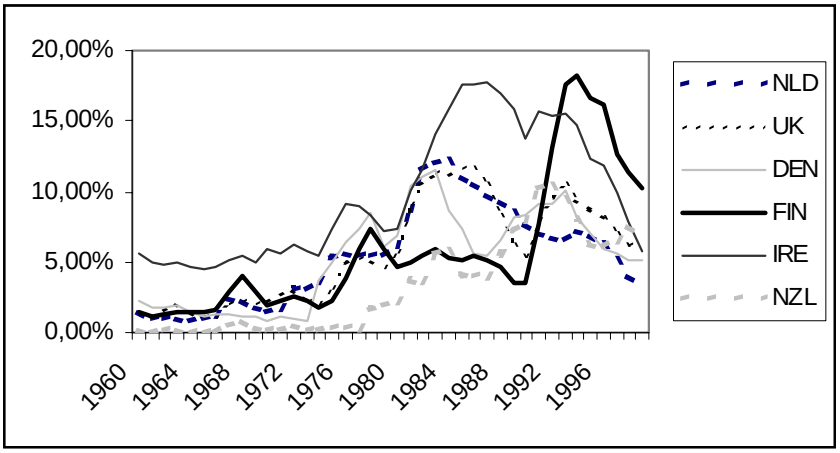

Figure 1.4: Unemployment rates in OECD countries (3)

trend[1] is a rise in the participation rates of women (from roughly 40% in the beginning of the sixties to 60% in Europe and 70% in North America in 2000, the exception being Japan with a more or less constant female participation rate around 60%), and a fall in the participation rate of men (from roughly 95% in the beginning of the sixties to 80% in 2000 in Europe and from 90% to 83% in North America over the same period of the time). A cultural change in the way family and work have been organized is generally considered as the main reason for this change in pattern. Increase in schooling and pre-retirement schemes explain part of the fall in the participation rates of men. As far as cross-country differences are concerned, we usually find that women participate less in Southern countries than in Nordic ones (Belgium and the Netherlands being found on the low side though). Participation rates differ also significantly across educational levels and age groups. More details can be found in the OECD Employment Outlooks.

The employment/population ratio is also a natural measure of labor market performance. Of course, the causes for its variation are far from obvious as they combine voluntary decisions by workers (as decisions to become self-employed or to withdraw from the labor force) but also more exogenous aggregate or specific conditions (such as recessions and booms, structural changes in the employment structure in the economy, etc.). However, as Table 1.1 shows, the employment/population ratios generate a picture that is relatively close to the one of the unemployment rates. Also over time the evolutions are linked. This suggests that employment is mainly driven by "involuntary forces", such as structural changes in the economy, recessions and booms, etc. Hence, we also observe that the changes in unemployment over the last decade are mostly reflected in changes in the employment rates (employment/population 15-64 ratio (OECD, 2001)).

The presentation of indicators of labor market performance is restrictive. Other indicators such as the level of self-employment, the incidence of long-term employment, the incidence of part-time and temporary employment, the number of average annual hours

[1] Source: OECD (1994)

	Employment rates (%)	Unemployment rates (%)
Switzerland	79.6	2.7
Netherlands	72.9	2.7
Norway	77.8	3.5
United States	74.1	4.0
Portugal	68.1	4.1
Ireland	64.5	4.4
Denmark	76.4	4.5
Austria	67.9	4.7
Japan	68.9	5.0
United Kingdom	72.4	5.6
Sweden	74.2	5.9
New Zealand	70.7	6.1
Australia	69.1	6.3
Belgium	60.9	6.6
Canada	71.1	6.9
Germany	66.3	8..1
Finland	67.0	9.9
France	61.1	10.1
Italy	53.4	11.0
Greece	55.9	11.3
Spain	56.1	14.1

Source: OECD Secretariat

Table 1.1: Employment and unemployment rates 2001

worked per person in employment, etc. are all other possible indicators enabling scientists and politicians to get an idea of how well the labor market is functioning. This subsection is limited to labor market stocks. But not less interesting are the dynamics observed on the labor market, i.e. job destructions and job creations, flows of workers between various states in the labor market or even between jobs. This is the purpose of the next subsection.

Labor market dynamics

Labor market flows are probably as interesting as labor market stocks as they give an idea of how dynamic the labor market is. Reallocation of labor between low productive to high productive places is a key mechanism, that will get a lot of attention in this dissertation. This subsection gives a brief overview of the developments of labor market flows over time and differences across OECD countries.

Job turnover is usually defined as the sum of gross job gains and gross job losses in the economy. It is measured by looking at the evolution of the stock of employment in establishments between two points in time. Therefore, it reflects only the net job changes by establishment and does not take internal reorganizations into account. Table 1.2 shows figures for some OECD countries. It appears that job turnover is large, when related to total employment, meaning that there are a lot of changes experienced by establishments over a year. Furthermore, the United States do not distinguish themselves very clearly from the rest of the developed world.

Also important for the functioning of the labor market are the movements between different states of the labor market, especially between unemployment and employment. In particular, the same unemployment rate may be compatible with two different types of labor markets: one where flows into and out of unemployment are large and another one where flows into and out of unemployment are low. These two labor markets call however for different types of labor market policies, as the unemployed workers in the

		Job gains	Job losses	Job turnover
Canada	1983-91	14.5	11.9	26.4
Denmark	1983-89	16.0	13.8	29.8
Finland	1986-91	10.4	12.0	22.4
France	1984-92	13.9	13.2	27.1
Germany	1983-90	9.0	7.5	16.5
Italy	1984-92	12.3	11.1	23.4
New Zealand	1987-92	15.7	19.8	35.5
Sweden	1985-92	14.5	14.6	29.1
United Kingdom	1985-91	8.7	6.6	15.3
United States	1984-91	13.0	10.4	23.4

Source: OECD (1994), Employment Outlook

Table 1.2: Job turnover in OECD countries

low-flow case tend to remain longer unemployed, they may experience skill depreciation or a bad signalling effect to the labor market. Table 1.3 shows figures for some OECD countries. It appears that the average duration of unemployment is by far much shorter in the Anglo-Saxon countries than in the rest of the developed world.

This very brief overview enables us to get a rough idea of the functioning of the labor markets in OECD countries. European countries are usually classified as performing less well than North America.

1.2.2 Labor Market Institutions in OECD Countries

Labor market institutions are usually defined as regulations that more or less directly distort the functioning of the labor market. Identifying conceptually what these could be is one step, the second being to find reliable indicators. These indicators are subject to discussion as they translate sometimes vague concepts such as "the strictness of regulation", etc. However, a lot of effort has been done to build reliable indicators, at least for comparability matters.

Table 1.4 portrays the most important labor market institutions identified in the lit-

United States	2.2	Belgium	54.2
Japan	5.6	Denmark	10.0
Germany	16.4	Finland	-
France	18.2	Greece	17.2
Italy	36.6	Ireland	36.9
United Kingdom	10.2	The Netherlands	22.5
Canada	3.3	Norway	3.4
Australia	5.4	Spain	86.7
Austria	3.7	Sweden	3.3

Source: OECD Secretariat

Table 1.3: Implicit average duration of unemployment (in months): 1987-1989

erature.

The first group of institutions is labelled as "public finance" institutions. These include labor and consumption taxes, government expenditures on passive (unemployment benefits), active labor market policies and education.

The taxes considered here are the ones that increase the discrepancy between the labor wage cost and the net consumable income. This *tax wedge* varies a lot across countries. Nickell and Layard (1999) give an overview of the total tax wedge[2] and marginal tax wedge[3] in selected OECD countries (see Table 1.5). It appears that continental European countries (and especially southern European countries) have a higher tax wedge than other OECD countries.

Regarding passive labor market policies such as the income support to unemployed workers, the literature usually looks at replacement rates, i.e. the ratio of the unemployment benefit and the average wage in the economy. Of course, unemployment benefits differ often according to the family situation, the previous earned wage, the duration of unemployment, etc. Furthermore, unemployment benefits may not be taxed as heavily

[2]Defined as the sum of payroll tax rate, income tax rate and consumption tax rate.

[3]Based on the OECD Jobs Study (1994). Calculated by applying the tax rules to the average production worker. Includes employees' and employers' social security contributions, personal income taxes and consumption taxes.

Group	Institution
Public finance	Labor taxes (payroll + income + consumption taxes) Social security contributions Unemployment benefits, Replacement rates Active labor market policies (expenditures, recipients) Public funding of education
Labor Standards	Minimum Wages Employment Protection Legislation (strictness)
Collective Bargaining Systems	Trade Unions bargaining power (Union density, union coverage) Level of bargaining and coordination
Barriers to mobility	Housing regulations, Pension schemes

Table 1.4: Labor market institutions

as labor incomes. The OECD computed an average gross replacement rate summarizing various situations and giving therefore a rough idea of the generosity of the unemployment benefit system. Table 1.6 presents the evolution of this ratio for selected OECD countries. There is no clear clustering of countries. Some countries usually thought as rigid present a very low level of average replacement ratio, such as Italy, Norway and Sweden. These exceptions being made, most European countries have a more generous unemployment benefit system than the United States and Japan. Note that the other Anglo-Saxon countries (Canada, Australia and the United Kingdom) are relatively generous.

Active labor market policies (ALMP) include training programs, or support in search activities of the unemployed. Table 1.7 presents the spending on ALMP as a percentage of GDP. Sweden, Ireland, Denmark, the Netherlands and Belgium spend the most on ALMP. The least "generous" countries are Japan, the United States and Canada. The general trend has however been towards an increase in the expenditures on ALMP.

The last institution grouped under the "public finance" label is the public financing of education prior to the entry into the labor market. Since indicators of labor market performance show that better educated workers usually face better labor market prospects

	Total tax wedge(%) 1989-1994	Marginal tax wedge (%) 1991-1994
Austria	53.7	-
Belgium	49.8	66.3
Denmark	46.3	72.1
Finland	65.9	66.1
France	63.8	63.4
Germany (W)	53.0	63.8
Ireland	34.3	-
Italy	62.9	62.0
Netherlands	56.5	70.8
Norway	48.6	62.9
Portugal	37.6	-
Spain	54.2	53.4
Sweden	70.7	62.6
Switzerland	38.6	-
UK	40.8	50.4
Japan	36.3	22.2
Australia	28.7	43.5
New Zealand	34.8	-
Canada	42.7	-
USA	43.8	38.5

Table 1.5: Tax wedge

	1970/74	1980/84	1990/94
Australia	15.6	22.5	26.4
Austria	7.9	27.4	28.7
Belgium	43.6	44.5	40.9
Canada	25.5	27.1	28.0
Denmark	50.9	56.4	62.8
Finland	13.6	21.2	20.3
France	23.8	29.4	37.8
Germany	28.7	29.0	28.3
Ireland	19.9	29.6	29.5
Italy	1.6	0.9	2.8
Japan	12.9	9.1	10.0
Netherlands	34.0	48.1	48.7
Norway	6.4	29.1	39.0
New Zealand	27.6	29.8	29.9
Sweden	0.5	6.6	6.7
Switzerland	4.0	13.9	26.0
United Kingdom	24.5	22.9	18.4
United States	10.9	14.3	11.5

Source: OECD Secretariat

Table 1.6: Average gross replacement rates

	1985	1990	1996
Australia	0.4	0.3	0.7
Austria	0.3	0.3	0.4
Belgium	1.3	1.2	1.5
Canada	0.6	0.5	0.5
Denmark	1.1	1.1	1.9
Finland	0.9	1.0	1.7
France	0.7	0.8	1.3
Germany (W)	0.8	1.0	1.4
Greece	0.2	0.4	0.3
Ireland	1.5	1.4	1.7
Italy	-	2.0	1.1
Japan	0.2	0.1	0.1
Luxembourg	0.5	0.3	0.3
Netherlands	1.3	1.2	1.4
New Zealand	0.9	0.9	0.7
Norway	0.6	0.9	1.2
Portugal	0.4	0.6	1.1
Spain	0.3	0.8	0.7
Sweden	2.1	1.7	2.4
Switzerland	0.2	0.2	0.5
United Kingdom	0.7	0.6	0.4
United States	0.3	0.2	0.2

Source: OECD (1996)

Table 1.7: Spending on ALMP (percentage of GDP)

than lower educated, institutions influencing the distribution of skills within the society are important for a labor economist. Hence, the accessibility to the education system measured by the extent of public funding and the number of graduations plays potentially an important role on labor market performance. Table 1.8 reproduces a table of the OECD (1995) showing the distribution of educational levels across the population. It shows that North America has a better educated population than European countries.

Table 1.9 presents the distribution of public and private funds in tertiary education. It appears that education is much more privately funded in North America than in Europe.

The second group of institutions relate to the "labor Standards". It includes regulations protecting income (by setting a floor to the wages for example) and employment. Several aspects deserve special care when describing the minimum wage institution. It differs according to the roles of the government and the social partners in its setting, mechanisms of indexation, coverage, special provisions (differentiation in rates according to various criteria) and levels. Table 1.10 summarizes information found in Bratt (1995) and in Dolado et al. (1996)[4]. Again the United States are the least requiring in terms of minimum wages (the ratio with the average earnings is the smallest).

Employment Protection Legislation includes a set of regulations that makes it harder for a firm to fire a worker. There are three types of regulations: one concerning the traditional open-end contracts, one concerning the regulation of fixed-term contracts and the last concerning the regulation of Temporary Work Agencies (which act as an intermediary in the temporary contracting between a firm and a worker). It includes different requirements: a requirement for noticing the person to be dismissed or a third party, a requirement for training or job re-orientation of dismissed workers, a requirement for authorization from a third party before dismissal can take place and a requirement regarding the noticing period and severance payments. The definition of unfair dismissal can also be more or less flexible, making it more or less hard for a firm to get rid of its workers. In the

[4]N = National, I = Industry, C.A. = Collective agreement

	$\leq$ lower secondary	$\leq$ Upper secondary	Non-university tertiary	University tertiary
Canada	29	30	26	15
United States	16	53	7	24
Australia	47	30	11	12
New Zealand	43	33	13	11
Belgium	55	25	11	9
Denmark	41	40	6	13
France	48	36	6	10
Germany	18	60	10	12
Greece	66	21	3	10
Ireland	58	25	9	8
Italy	72	22	-	6
The Netherlands	42	37	-	21
Portugal	86	7	2	5
Spain	77	10	3	10
United Kingdom	32	49	8	11
Austria	32	61	-	7
Finland	39	43	8	10
Norway	21	54	13	12
Sweden	30	46	12	12
Switzerland	19	60	13	8

Source: OECD (1995)

Table 1.8: Distribution of population across education levels (share of the population of age 25-64)

	Public funds Share of GDP (%)	Private funds Share of GDP (%)	Share private in education funding	Share public in education funding
Japan	0.3	0.5	37.5	62.5
United States	1.3	1.1	54.2	45.8
Spain	0.8	0.2	80.0	20.0
Ireland	1.3	0.3	81.3	18.7
Australia	1.9	0.4	82.6	17.4
France	0.9	0.1	90.0	10.0
Canada	2.4	0.1	96.0	4.0
New Zealand	1.4	0	100	0
Denmark	2	0	100	0
The Netherlands	1.8	0	100	0
Sweden	1.6	0	100	0

Source: OECD (1995)

Table 1.9: Public expenditures in tertiary education (in percent)

theoretical literature, Employment Protection Legislation is therefore usually modelled by a pure cost incurred by the firm at separation or as a transfer from the firm to the worker. OECD (1999) gives a nice overview of the major changes in the two main components of employment protection: traditional open-end contracts and temporary employment. Table 1.11 presents the indicators of the strictness of employment protection regulation. The countries are ranked according to the strictness of the regulation protecting regular contracts. As shown in the first column of Table 1.11 English speaking countries are the most flexible. Then come the countries from continental Europe, Northern Europe and finally, Southern Europe. By and large, the overall strictness with respect to the regulation of temporary employment, shown in the second column of Table 1.11 has the same pattern. The last two decades have been marked by significant liberalizations in the use of fixed-term contracts in countries that sometimes had very stringent regulations. Among them, Belgium, Finland, France, Germany, the Netherlands and Spain eased, for some of them considerably, the legal restrictions on recourse to various forms of tempo-

	Type	Set by	Ratio with average earnings
Australia	N	C.A.	-
Austria	I	C.A.	0.62 (1993)
Belgium	N (since 1975)	C.A.	0.60 (1992)
Canada	N	Law	
Denmark	I	C.A.	0.54 (1994)
Finland	I	C.A.	0.52 (1993)
France	N	Law	0.50 (1993)
Germany	N	C.A.	0.55 (1991)
Ireland	I (low-paid)	Law	0.55 (1993)
Italy	I	C.A.	0.71 (1991)
Japan	N	Law	
The Netherlands	N (since 1968)	Law	0.55 (1993)
New Zealand	N	Law	
Norway	I	C.A.	0.64 (1993)
Sweden	I	C.A.	0.52 (1992)
Switzerland	I	C.A.	0.52 (1993)
United Kingdom	I (until 1993)	Law	0.40 (1993)
United States	N	Law	0.39 (1993)

Table 1.10: Minimum wages

rary employment. An important step in these reforms was the allowance of the use of temporary contracts for non-temporary activities. Reforms in the employment protection system have sometimes been accompanied by reforms of the social security system. For example, in order to promote the use of fixed-term contracts, the Italian government established fiscal incentives for the employer in the form of social security tax relief (Adam and Canziani (1998)).

The incidence of temporary employment is shown in the fourth column of Table 1.11. This incidence is relatively small in most of the OECD countries, with the exception of Australia and Spain. Furthermore, the evolution of the share of temporary employment has been quite stable in the majority of countries. Nevertheless, it increased significantly in Australia, France, the Netherlands and Spain and decreased in Belgium, Greece, Luxembourg and Portugal. The variation in temporary employment may have to do with its attractiveness relative to permanent contracts. Bentolila and Dolado (1994) note that the share of temporary employment in total employment is the highest in countries where traditional arrangements are very rigid.

The third class of institutions relates to the collective bargaining systems. Indeed, in most OECD countries wages are set collectively by workers and firms representatives. A first important characteristic of these collective systems is their scope, i.e. the extent to which collective agreements apply to the workforce. The *union density* or percentage of the workforce member of a union is one indicator of the reach of collective agreements. However in some countries (like in France), the union density tells little about the effective coverage of collective agreements as they generally apply to the entire concerned workforce. Therefore, the *union coverage,* measuring the percentage of workers covered by a collective agreement, is maybe a more appropriate measure of the bargaining power of the unions. Table 1.12 reproduces a table of the OECD (1997)[5].

There are three main conclusions one can draw from this table: First, union coverage

[5]The data do not always correspond exactly to the year. For more details, see OECD (1997).

	Open End Contracts		Fixed Term Contracts		Temporary Work Agencies		Incidence of temporary employment (%)	
	End 80s	End 90s	End 80s	End 90s	End 80s	End 90s	1989	1999
USA	0.2	0.2	0	0	0.5	0.5	0.8	-
UK	0.8	0.8	0	0	0.5	0.5	5.4	6.8
Canada	0.9	0.9	0	0	0.5	0.5	-	-
Australia	1.0	1.0	1.3	1.3	0.5	0.5	19.9	-
Ireland	1.6	1.6	0	0	0.5	0.5	8.6	-
New Zealand	-	1.7	-	0.3	-	0.5	-	-
Switzerland	1.2	1.2	1.3	1.3	0.5	0.5	-	-
Belgium	1.5	1.5	5.3	2	4	3.5	5.1	10.3
France	2.3	2.3	3.5	4	2.6	3.3	8.5	14
Austria	2.6	2.6	1.8	1.8	1.8	1.8	-	7.5
Germany	2.7	2.8	3.5	1.8	4	2.8	11	13.3
Netherlands	3.1	3.1	1.5	0.8	3.3	1.6	8.5	12
Denmark	1.6	1.6	1.3	1.3	4	0.5	10	10.2
Finland	2.7	2.1	3.3	3.3	0.5	0.5	11.9	18.2
Norway	2.4	2.4	3.3	3.3	3.8	2.3	-	-
Sweden	2.8	2.8	2.7	1.8	5.5	1.5	-	13.9
Greece	2.5	2.4	4	4	5.5	5.5	17.2	13
Spain	3.9	2.6	1.5	3	5.5	4	6.3	9.8
Italy	2.8	2.8	5.3	4.3	5.5	3.3	26.6	32.7
Portugal	4.8	4.3	2.3	2.3	4.5	3.8	18.7	18.6

Source: OECD (1999)

Table 1.11: Strictness of employment protection legislation

	Trade union density (%)			Bargaining coverage (%)		
	1980	1990	1994	1980	1990	1994
Australia	48	41	35	88	80	80
Austria	56	46	42	98	98	98
Belgium	56	51	54	90	90	90
Canada	36	36	38	37	38	36
Denmark	76	71	76	69	69	69
Finland	70	72	81	95	95	95
France	18	10	9	85	92	95
Germany	36	33	29	91	90	92
Italy	49	39	39	85	83	82
Japan	31	25	24	28	23	21
Netherlands	35	26	26	76	71	81
New Zealand	56	45	30	67	67	31
Norway	57	56	58	75	75	74
Portugal	61	32	32	70	79	71
Spain	9	13	19	76	76	78
Sweden	80	83	91	86	86	89
Switzerland	31	27	27	53	53	50
United Kingdom	50	39	34	70	47	47
United States	22	16	16	26	18	18

Source: OECD (1997)

Table 1.12: Union density and coverages (in percent)

is sometimes much larger than union density (such as France). Second, union density tends to decline with time while union coverage has remained stable. Third, the Nordic countries and continental Europe have on average stronger unions than the rest of the OECD countries.

A second important characteristic is the *level* (firm, sector, national) at which bargaining takes place. The objective functions of the partners and the variables it considers as endogenous vary according to the bargaining level. But the bargaining level is not all. Indeed, bargaining units can coordinate. For example, if bargaining takes place at the sector level, the parties can coordinate between sectors on a certain level of wage growth, etc. without having an official centralized bargaining system. Hence, the literature sometimes refers to *corporatism* rather than *centralization*.

Canada and the United States have a tradition of very decentralized bargaining. Japan and Switzerland bargain at the decentralized level but are very well coordinated. Nordic countries have a more corporatist tradition, although the general trend over the last decade is towards a more decentralized setting of wage agreements.

The fourth group of institutions concern the barriers to mobility. As far as I know, no suitable indicator of "barriers to mobility" have been built so far for the OECD countries. The belief is however that in general, it is less costly to migrate in the United States than in European countries (within or between countries).

The overall conclusion of this descriptive analysis is that the United States have in general much more flexible and decentralized institutions. The rigidity of European countries varies a lot, also depending on the type of institution. Nordic countries have a well-organized centralized bargaining system, Southern European countries are characterized by solid labor standards and continental European countries have generous unemployment benefits. The next section turns to the effects of labor market institutions on labor market performance.

1.2.3 Labor Economics, Institutions and Performance

The economics of labor is a wide and rich field, where theory and empirical analysis go hand in hand. It is "special" as it studies the forces determining the trade of a good that cannot be separated from its supplier. An introduction into the field of labor economics covers generally theories of the labor supply and labor demand decisions, of the equilibrium on the labor market determining the wage and employment. The competitive model is usually considered as a benchmark, as one knows that the world teems with imperfections. Institutional regulations have often been considered as distorting the functioning of the labor market, i.e. as taking the equilibrium of the labor market away from the competitive equilibrium. Far from having the ambition to give an overview of the entire field, this section gives a flavour of the most important theories which have been used to analyze the functioning of the labor market in presence of institutional rigidities and the reasons for the existence of unemployment in the modern developed world.

There are many reasons why the equilibrium of the labor market could differ from the competitive equilibrium. This dissertation concentrates on two mechanisms widely used in the literature in labor economics. The first mechanism is the one considered in an important branch of the literature that has tried to model explicitly the behavior of institutional actors and the influence of specific labor market regulations ("bargaining models") and the second mechanism is linked to the imperfect information on the labor market such that finding a match is a time consuming activity ("search models").

Closer to the focus of this dissertation, all chapters are inspired by empirical findings on the effects of labor market institutions on labor market performance. The last paragraph of this section presents a brief overview of the most relevant studies.

Bargaining models

The earliest traces of modelling of collective bargaining systems are probably to be found in Hicks (1932). Later on, models using a game-theoretic approach have explicitly mod-

elled the bargaining procedure and outcomes (Nash (1950, 1953), Rubinstein (1982)). The translation into labor economics terms has lead to "collective bargaining models" such as the right-to-manage model by Nickell and Andrews (1983) (with the monopoly union model as a particular case) and the model of efficient bargaining (Manning (1987)). Layard, Nickell and Jackman (1991) probably offer the richest overview of variants of these models. Hence, they show how one can model wage bargaining according to the bargaining level (firm, industry or national). In most OECD countries, unions and representatives of firms decide on many important aspects related to the employment relationship between a worker and a firm.

The design of a suitable bargaining model calls for the answer to the two following questions: What do firms and unions bargain on? And the related question: What do the bargaining partners care about?

The setup of a bargaining model requires a precise definition of the objectives of the partners involved in the bargaining. Hence, one needs an answer to the second question: What do unions care about? What do they maximize? One should first keep in mind that unions *represent* workers, and therefore their preferences will be some aggregation of individual preferences. Therefore, one should be careful when defining the objective function of the unions, in particular about the assumptions made on individual preferences. The easiest way to go is to assume that all individuals are the same and, therefore, that unions maximize the utility of any member it represents (Drèze and Modigliani (1981), Mac Donald and Solow (1981) and Oswald (1982)). Dunlop (1944) considered in that line a number of possible union objectives (maximization of total employment, maximization of average wages, maximization of the wage bill of members, maximization of the wage bill of employed and unemployment benefits of unemployed). A simplifying assumption then is that workers are risk neutral. Hence, in the case of a union maximizing the expected utility of a representative member, the union just maximizes the expected income of the

worker:

$$UR = lw + (1 - l)b, \tag{1.1}$$

where UR is the utility of a representative union member, l is the probability of being employed (and $(1 - l)$ the probability of being unemployed), w is the wage and b is the unemployment benefit.

It is also often assumed that unions care more about "rents", i.e. the difference between the inside and outside options. In the same line we find models assuming that unions care about some kind of "fair pay", i.e. they maximize a difference between the wage and a "minimum wage" or "normative wage".

$$UR = (w - \overline{w})l, \tag{1.2}$$

where $\overline{w}$ is the minimum wage or the normative wage (it could for example be the wage in the competitive sector, or the minimum wage set by law, or the "alternative" wage). Or more generally, the unions caring also about employment could also have some minimum required level of employment $\overline{l}$, their objective function taking the form of a Stone-Geary utility function:

$$UR = (w - \overline{w})^{\zeta}(l - \overline{l})^{1-\zeta}, \tag{1.3}$$

where $0 \leq \zeta \leq 1$.

The assumption of identical individuals with identical preferences is rather strong. It is possible to relax it to some extent, by assuming for example that the objective of the unions is the result of a democratic internal process, i.e. that the objective is defined by a median voter. However, using the median voter requires again strong assumptions: (1) there must be a unique decision subject on which the union members vote, (2) preferences of the individuals must be single-peaked, and (3) the decision must be taken by the majority of the union members. These assumptions are not very realistic as unions often bargain on a lot of matters at the same time.

On the other side of the bargaining table, we find the firms or representatives of the firms. What is usually assumed is that firms care about profits and are risk neutral. Of course, the dichotomy managers - shareholders raise agency problems that imply that managers do not necessarily want to maximize profits but maybe their own salaries or other personal "compensations". Booth (1995) notes that "in the private sector, there is always the threat of potential takeover of an inefficient company (and subsequent change of management) which, it is argued, ensures that management broadly follows the profit maximization objective". Furthermore, for the firms to agree on a wage higher than the competitive equilibrium, they must benefit from some rents that can for example come from the imperfect competition on the product market (although it does not necessarily have to, see Booth (1995)).

Let us now turn to the first question: What do the unions and the firms bargain? There is a wide range of elements which are brought to the bargaining table. Wage setting is by far the most popular subject of negotiation (see Cahuc and Zylberberg (1994)). Then we find employment, working time, union's rights, training, pre-retirement schemes, working environment, etc. that all can be potential subjects of bargaining. Of course, the law often determines some minimal requirements but the bargaining partners are free to agree on higher standards. The most common bargaining models are the right-to-manage model (Nickell and Andrews (1983)), with a particular case being the monopoly union model (where the union's bargaining power is equal to 1 on a scale from 0 to 1) and the efficient bargaining model. In the first case, unions and firms negotiate over the wages, while in the second case, they bargain both on the employment and wages. The essential difference in outcomes being that the solution reached in the second case is more efficient than in the first case. However, as already mentioned before negotiations do not often deal with employment directly.

Search models

As in any other relationship, agents in search for a partner do not have perfect information about each other, meaning that finding a partner is a time consuming activity. This reasoning lies behind the literature on search frictions (Stigler (1962) and McCall (1970)) that essentially focuses on the dynamics of the labor market. Bad shocks arise all the time, and workers need to reallocate from bad productive places to better ones. However, there is no "invisible hand" guiding everyone immediately to the right place but a time and resource-consuming process resulting in matches, but also in inevitable unemployment and vacancies. This also means that the partners, once they found each other, have some kind of monopoly power with respect to each other. The idea is that the partners cannot be replaced at zero cost, which means that the relationship as a whole is more valuable than the sum of the outside options of the partners. The difference between the inside option and outside option is the rents or surplus. It is usually assumed that the partners share this surplus according to a bargaining rule (the Nash sharing rule being by far the most used one). This literature is interesting as it emphasizes the problem of labor reallocation from bad to good productive places. Labor mobility has a cost that leads to the existence of rents for the partners who found each other. Hence, labor migration is an important mechanism of adjustment in case of negative shocks for example, to regions. This point will get more attention in the next Chapters. The literature on search frictions has grown a lot and has recently even been used as an interesting tool to analyze the effects of some institutions (Mortensen and Pissarides (1999)). Institutions play a role here as they determine the inside and outside options of the partners, but also as they determine the costs of reallocation (think for example of housing regulations or the employment protection legislation).

Chapter 2 is inspired by the literature on bargaining models. This framework appears indeed to be the most appropriate to a general study of the effects of labor market institutions, considered as a set of interacting elements. The other chapters build theories

based on the literature on search frictions, therefore focusing on the dynamics of the labor market.

The effects of Labor Market Institutions on Labor Market Performance

There is a rich literature on the effects of labor market institutions on economic performance, where important lessons have been drawn but puzzles persist. There are many studies concentrating on some particular institutions only and only few looking at a more complete picture of the institutional framework. A first series of studies analyze the direct effects of institutions on indicators such as the unemployment rate, the employment rate and the growth rate of the national product. Then several extensions have been made. First, Blanchard and Wolfers (2000) suggest that the European institutions themselves are not bad, but that they influence the way the economy responds to shocks, such as the ones experienced in the seventies. Second, in the line of what Chapter 2 investigates, several papers suggest that it is the combination of institutions that matters rather than the institutions themselves, i.e. that the institutional framework should be considered as a set of *interacting* elements. This section presents a brief overview of these main trends.

Theory

Independent Institutions Let us first start by considering the institutions independently.

Depending on how the *tax wedge* is shared between firms and workers, it influences the net consumable income, and therefore the incentives to work, and the total labor costs, and therefore the incentives to employ workers.

Regarding the distribution question, Nickell (1997) argues the following:

"If capital is internationally mobile and labor is not, then we should expect to see labor bearing all the tax burden. In this case, employment and unemployment will in the long run, remain unaffected by changes in the overall tax rate on labor"

There is however one exception to this rule, as the presence of a minimum wage prevents the adjustment of low wages to tax increases.

The *unemployment benefits* determine the option value of being unemployed. It influences (negatively) the incentives to search and enables the workers to bargain high wages (as the unemployment income determines the outside option). All in all, unemployment benefits should have a negative effect on labor market performance.

Active labor market policies are usually thought as measures helping the unemployed workers to find a job. They take the form of a training or a subsidy to firms for hiring certain types of workers. Their expected effect on unemployment should therefore be negative.

Education (public or not) increases human capital and therefore contributes to a better labor market performance (Becker (1964)). The literature is also very wide and beyond the scope of this introductory Chapter.

Minimum wages influence the functioning of the labor market as they represent a floor for the labor costs. A high minimum wage would therefore reduce the labor demand for workers who are at the bottom end of the productivity distribution.

Employment protection legislation makes firings more expensive and introduces some irreversibility in the hiring decision (Siebert (1997)). One therefore expects that EPL has a negative effect both on job creation and job destruction, and therefore, an ambiguous effect on unemployment (Mortensen and Pissarides (1999)). EPL has therefore a negative impact on unemployment in- and outflows.

There is large literature on the effect of *unions* on labor market performance. Typically, unions raise wages and therefore reduce employment. The payoffs of unions and firms depend on the level at which they bargain (see Layard, Nickell and Jackman (1991)). Calmfors and Driffill (1988) suggest that there is a hump-shape relationship between the degree of centralization and the unemployment rate. There are basically two mechanisms at work. First, at the decentralized and sector level, firms take prices as given. At the

centralized level, a price increase means general inflation and so lower real wages. Second, at the decentralized level, firms face a fierce competition and therefore cannot translate wage increases into price increases. At the sector and centralized level, they are less constrained as their most direct competitors are also included in the bargaining. Therefore, the forces of competition prevent bargaining partners at the firm level to set high wages. At the central level, there is no gain in setting high nominal wages as they will lead into inflation and therefore no real wage gains. At the sector level on the other hand, sectors are too small to take their effect on the general price level into account and furthermore, they do not suffer from competition. This means that the temptation to set high wages at the sector level is much stronger. All sectors do the same, which means that the wages are high, the inflation is high and the level of employment is low.

The idea was very seducing and it was extended in many ways. For example, Calmfors (1993) modifies the argument by talking about corporatism, rather than centralization. Coordination between bargaining "units" could play the same role as centralization, as this would mean that these units take the effects of their decision on general macroeconomic variables (such as the inflation) into account. One could also think that the net income effects are more likely to be taken into account at the central level, i.e. that an increase in wages leads to more unemployment and therefore, more social security expenditures and, therefore, more taxes levied on labor and less net consumable income. In brief, a channel very similar to the "inflation" channel, as the actors take the effects on the purchasing power into account.

Barriers to labor mobility have a negative effect on labor market performance by definition, as they increase the costs of reallocation of labor. Hence, Oswald (1996) suggests that home-ownership is a barrier to mobility and would therefore harm the functioning of the labor market.

Institutions and Shocks Blanchard and Wolfers (2000) suggest that it is the combination of adverse shocks and some institutions that resulted in the poor European labor market performance. The idea goes as follows. First, when unemployment is high and therefore unemployment duration is long, some workers may lose their skills or not find it profitable to search for a job, and therefore, reduce the downward pressure of unemployment on the wages. Second, when unemployment is high, firms can be more "picky" in their recruitment decision so that some workers become actually marginalized. European institutions play a role here if they increase the duration of unemployment (such as for example the employment protection legislation).

Combination of Institutions Coe and Snower (1997), Daveri and Tabellini (1997) and Chapter 2 of this thesis all argue that the effect of one given institution depends on the rest of the institutional framework. Coe and Snower show for example that institutions discouraging unemployed workers to search for a job (such as high unemployment benefits) reduce the effectiveness of reforms aimed at stimulating hirings, as the latter also depends on the search intensity of the workers. Daveri and Tabellini (1997) show that the effect of labor taxes is likely to be much larger is countries with strong unions.

Empirical Evidence Most of the studies based on macroeconomic data essentially focus on the effects of labor market institutions on the *unemployment rate.* The lack of time series data regarding worker and job flows probably explains the absence of the variables as dependent variables. Hence, empirical work based on macro data concentrates on labor market stocks. It is however possible to extract some information with respect to labor market dynamics by looking at the effects of institutions on the shares of short-term and long-term unemployment. Some studies are also concerned with other indicators of economic performance, such as the growth rate, etc., which is beyond the scope of this introductory chapter. Microeconomic studies are much richer in their analysis of the

Institutions	Sign of the coefficient
Total Tax Rate (%)	+
Replacement Rate (%)	+
Benefit Duration	+
Active Labor Market Policies (Instrumented)	-
Employment Protection Legislation	0
Union Density	+
Union Coverage Index	+
Coordination Unions-Employers Index	-
Owner Occupation Rate (%)	+

Table 1.13: Nickell (1998)

transitions from one state of the labor market to another state (as from unemployment to employment) but fail to give a global picture about the overall effect of the institutional framework.

The interested reader will find more extensive information in Nickell and Layard (2000) and OECD (1994). The first study presented here is of Nickell (1998). He basically regresses the standardized unemployment rate on a series of labor market institutions. An original variable included here is the owner occupation rate, inspired by an empirical analysis by Oswald (1996). Nickell proposes empirical results based on twenty OECD countries over two time periods: 1983-88 and 1989-94. Table 1.13 summarizes the main results of this study. Note that Nickell finds a negative effect of EPL on the short-term unemployment rate and a positive effect on the long-run unemployment rate.

Scarpetta (1996) uses yearly data covering the period 1983-1993. The explanatory variable is the structural unemployment rate[6] as computed by the OECD. Scarpetta first looks at structural determinants of the unemployment rate and then, at the role that labor market policies and institutional factors play in determining the persistence of unemployment. The conclusion is that institutions matter both for the determination

[6]Defined as the non-accelerating inflation rate of unemployment.

of the structural unemployment rate and for the speed of labor market adjustments. Scarpetta finds different results than Nickell for the labor taxes (no significant effect) and the employment protection legislation (significant positive effect). Furthermore, the hump-shape relationship between centralization and unemployment finds some empirical support. Finally, generous unemployment benefits, employment protection and a high degree of unionization are all found to have a positive effect on the adjustment period.

Elmeskov, Martin and Scarpetta (1998) extend the previous analysis by considering a large number of countries, taking the recent institutional developments into account (in particular, the evolution of collective bargaining structures and of the employment protection legislation) and testing for the existence of interactions between policies and/or institutional factors. They conclude that the tightening of eligibility conditions and the cut in unemployment benefits, as well as the relaxation of the regulation on fixed term contracts may have played a determinant role in the success of some OECD countries in reducing their unemployment rate. Furthermore, assuming that in countries where the degree of centralization is medium (negotiations mainly taking place at the industry level), coordination among actors might be particularly crucial, they upgrade countries with a medium level of centralization but a high degree of coordination. They also find empirical support for the interaction hypothesis. They show that the tax wedge and the EPL have a stronger effect in countries with an intermediary level of centralization. Also, unemployment benefits have a larger effect in countries with relatively high levels of expenditures on active labor market policies.

Daveri and Tabellini (1997) look at complementarities between labor taxes and the structure of collective bargaining systems. Their analysis is based on data for fourteen OECD countries over the period 1965-1991. They find that labor taxes have a larger negative effect on unemployment in countries with strong unions. They also show that decentralized and centralized countries are performing better, irrespective of the level of labor taxes.

Blanchard and Wolfers (2000) use data based on twenty OECD countries and eight five-year periods, from 1960-64 to 1995+. They test for the effects of institutions (similar to the ones in Nickell (1998)), shocks (in total factor productivity, real interest rate and labor demand shifts) and interactions between institutions and shocks on the unemployment rate. They find that indeed the economic shocks[7] have a larger positive effect on unemployment when the replacement rate is high, the benefit duration is long, the employment protection is strict, the union density is high and the coordination is low.

1.2.4 Political economy of institutions

Since institutional rigidities seem to be the most prominent explanation of why European labor markets perform much worse that US labor markets, it is interesting to analyze the political economy of these institutions.

These countries are democracies and these institutions are mostly set by governments. Therefore, this section pushes the door into the literature of political economy of labor market institutions.

The political economy of labor market institutions leans against the more traditional literature on endogenous policy determination, for example on redistribution policies from rich to poor (Meltzer and Richard (1981)), from young to old (Browning (1975), Breyer (1994)), from employed to unemployed (Wright (1986)). Most of these contributions use the median-voter model to describe the process of political-decision making. The median-voter model is simple. It assumes that each member in the population has one vote and that each vote has the same weight. The two key assumptions for the median voter model are (Mueller (1989)) (1) that issues are defined along a single dimensional vector and (2) that preferences are single–peaked in that one dimension. Others (such as Grossman and Helpman (1994), Becker (1983, 1985)) consider other political decision-making processes

[7] The economic shocks enter the regression in such a way that their expected theoretical sign on the unemployment rate is positive. Hence, they consider a fall in the total factor productivity, a rise in the real interest rate and a decline in the labor share.

such as the lobbying by interest groups. It makes sense to look at interest groups in labor economics as unions and representatives of employers participate actively to the political arena. Their role is to some extent taken into account in models in the line of Saint-Paul (2000) as they are built up around the concept of rents, which can obviously arise in the presence of these powerful interest groups that unions are. Saint-Paul (2000) also studies the political feasibility of a reform. He identifies three main factors hampering the labor market reform: (1) the negative effect on the welfare of the decisive voter (who is most likely low-skilled employed), (2) the uncertainty about the winners and losers of the reform and (3) the lack of political influence of the winners (unemployed) of the reform. The effect of a reform on the welfare of the decisive voter goes through two channels: the (expected) income effect and the exposure (to unemployment) effect. For example, a relaxation of the EPL has a negative effect on the expected income (lower insider power) and increases the exposure to unemployment of employed workers. Therefore, the median voter would never support a relaxation of the EPL.

1.2.5 Human capital investments

On-the-job investments

The literature on on-the-job investments is concerned with the following two questions: Who is paying for the investments? And are the investments optimal? Malcomson (1999) identifies three types of reasons for contracting: (1) to allocate risk, (2) to protect specific investments and (3) to motivate employees. The second type of motivation is particularly interesting for this dissertation. Becker (1964), in his seminal work, draws a crucial distinction between general and specific skills. General skills are the ones that workers can use anywhere else than at the firm where they are employed, i.e. they can take their investment with them when they leave. Specific skills on the other hand are skills that the worker can only use with a particular employer. Therefore, separation means losing all future possible gains from this investment. The conclusion reached by Becker is that

the worker will have to bear the cost of general training (as he is the one who can capture the full return of the investment) and, in contrast, the cost and return to specific human capital are shared between the worker and the firm. Since then the literature has grown a lot (see Gibbons and Waldman (1999), Malcomson (1999)). Specific investments lead to situations of bilateral monopolies, i.e. where both parts could be better off together than without each other. Two main problems have been addressed: the problem of imperfect information (or uncertainty about future outcomes) and the problem of observability of investments, resulting productivities, outside options, etc. (tangibility. i.e. translating the idea that one can go to court with evidence). Concerning the information problem, Hall and Lazear (1984) show that there exists in this context no feasible wage-determination scheme that achieves separation efficiency. The other problem in the approach of Becker is that investments may not be contractible in the first place (problem of observability). If there is no contract specifying a payoff for each partner as a function of their investment, but for example a Nash bargaining rule sharing the surplus once post-investment productivities have been revealed, both the firms and the workers will underinvest in the relationship (hold-up problem, see Williamson (1975, 1979) and Klein et al. (1978)).

Human capital theory

Human capital theory studies the determinants of acquisition of human capital, at the beginning focusing essentially on the human capital acquired through off-the-job education (schooling prior to the entrance into the labor force). Becker (1964) and Mincer (1974) are the first to talk about the education decision as an economic decision, i.e. an investment into a capital (human capital) that has a cost and a return. The essential conclusion is that people invest into education until the point where the marginal return to education is equal to the marginal return to any other investment in the economy (reflected by the interest rate). The gains of education are higher expected earnings and the costs are direct (tuition, books, etc.) and indirect. The indirect, or shadow cost of education, is

the opportunity cost of spending time at school rather than on the labor market.

Matching models and education

Introducing heterogenous agents in a matching model can be done in various ways. The way Chapter 4 does it is by assuming that high skilled workers can perform low skilled tasks as well. Similar models with heterogeneous agents are McKenna (1996), Gautier (2002) and Albrecht and Vroman (2002), which have a similar definition of skill: skilled workers have a comparative advantage in the performance of skilled tasks, but are as productive as unskilled workers in unskilled tasks.

1.2.6 Economics of migration

Generalities

In case of negative shocks, the labor market needs to adjust. Labor mobility is a possible adjustment process. However labor mobility is low in European countries (see Puhani (2001) for an overview). Furthermore, labor mobility does not respond to economic differentials (Barro and Sala-i-Martin (1995), Bentivogli and Pagano (1999)).

Migration to cease better job opportunities has been analyzed first in the context of developing countries (Harris and Todaro (1970)). Migration was then seen as a once-for-all decision, basically from developing countries to the developed world. Later on, return migration has been studied (Dustmann (1994), Stark et al. (1997)).

Migration as an insurance device

Migration can be thought of as an insurance device against income fluctuations, in the absence of well-functioning financial markets. Employment protection legislation is a competing instrument to reduce the income variation associated with labor market shocks (such as an aggregate shock to productivity). Stark (1991) introduces migration as a risk-diversification device in the context of rural-urban migration in developing countries.

However, when migration is not possible, i.e. when this instrument to maintain a high average income is not available, one needs a substitute for it. Hence, income and job protection systems can be thought as alternative income protection instruments.

Migration and institutions

Interesting for the purpose of this dissertation, a branch of the literature has studied the interactions between the institutions and the migration decision. A first type of models analyze the effects of institutional asymmetries on labor mobility (Huizinga (1999)), or what are the effects of migration in societies with particular institutions (Michael and Hatzipanayotou (2001)), taking the institutions as given. Others study the political determination of institutions, given the migration possibilities (Razin and Sadka (1997, Leite-Monteiro (1997), Cremer and Pestieau (1998) for the recent examples). These models analyze the effects of labor mobility on the political preferences for redistributive institutions. Indeed, labor mobility changes the structure of the population and therefore potentially the preferences for redistribution.

Migration and education

Also interesting for the purpose of this dissertation, there is a literature on the migration decision, given the educational level. This literature investigates whether high-skilled and low-skilled workers have different incentives to migrate. The literature on the brain drain (Grubel and Scott (1966)) develops the idea that high-skilled workers in developing countries have more incentives to migrate than low-skilled workers. Migration opportunities would therefore have a negative effect on the economic performance of these countries, as these lose the most productive part of their labor force. More recently, Stark, Helmenstein and Prskawetz (1997) show that this is not necessarily true. They introduce asymmetric information on the side of employers in the developed countries that would make migration profitable for some workers in a first time but that they would then return to their

country. This would mean that migration opportunities stimulate investments in human capital that would have never been made otherwise.

1.3 Summary and conclusions

The theoretical and empirical work so far has contributed to a better understanding of what happened in Europe and why it did not happen in the United States. However in the last two decades, several European countries (the Netherlands, Denmark, Ireland) succeeded in reducing the unemployment rate. What was so special about them? This is the question addressed in the Chapter 2. It goes further with the argument of interactions between institutions. The theoretical model is a simple extension of the model by Nickell and Andrews (1983) that suits well for an analysis of the effects of labor market institutions. The model can be pictured with two curves: a labor demand curve and wage bargaining curve. The institutions determine the elasticities of these curves and the magnitude of the shifts following an institutional change. The conclusion of the theoretical study is that institutional reforms may indeed have very different effects according to the rest of the institutional framework. A low degree of centralization for example means that the wage and labor demand curves are flat (in a graph where employment is on the X-axis and wage on the Y-axis) and therefore that an institutional change is likely to have more employment effects. The empirical analysis uses some other indicators than the studies mentioned hereabove. Some institutional indicators used in the previous studies have very little time variation (such a the index for employment protection legislation, centralization, coordination, etc.). However major institutional changes have been implemented in some OECD countries that are not reflected in these indicators. Therefore Chapter 2 uses indicators that carefully reflect institutional changes. Indeed, the ambition is to explain why some institutional reforms had better effects in some countries than others. Chapter 2 uses data on seven five-year periods and 18 OECD countries. It finds support

for the interaction hypothesis. But it also shows that some institutional changes have been better irrespective of the initial institutional framework. Hence, it shows that most of the OECD countries would have experienced a better labor market performance if they would have implemented the reforms made in the Netherlands or in the UK.

Chapter 3 looks at the political support for Employment Protection Legislation. On one extreme, we find the Anglo-Saxon countries, and in particular the United States, that have a very flexible employment protection (low firing costs, if any). On the other extreme, we find continental and southern Europe where a series of rigid rules guide the firing decisions. The question is: Why are the political preferences for Employment Protection Legislation so different in the United States than in most European countries? There are three essential key features in the model: (1) employment protection is determined by the median voter, who is most likely employed, (2) the labor market is modelled within a matching framework, which implies that employment protection reduces both job creation and job destruction, i.e. makes it harder for an unemployed to find a job and easier for an employed worker to keep his job even in bad times, (3) migration and employment protection are (the only) two competing income protection devices for the workers against negative shocks. In a country with low migration costs, the median voter is more likely to prefer no employment protection (and so a high job finding rate once unemployed) so that he can move quickly to the best productive places. Given these three features, Chapter 3 shows that assuming that the US and European countries differ in essential characteristics such as the migration costs (within country), the most mobile country will prefer a lower level of EPL. European countries have lower migration opportunities such that workers prefer safe jobs even if this means being maintained in low productive activities and longer unemployment spells. Once in place EPL reduces even further the incentives to migrate which suggests that there is a two-way relationship between EPL and migration. Migration opportunities determine the preferences for EPL and EPL determines the profitability of migration.

The question treated in **Chapters 4 and 5** is the following: Does employment protection make sense? Again, the focus is on Employment Protection Legislation. **Chapter 4** looks at the effect of Employment Protection on the accumulation of human capital prior to the entrance into the labor market. One conclusion of Chapter 3 was that when one must incur high migration costs in order to work in his best job opportunity, employment protection may increase his welfare. Chapter 4 elaborates the argument by introducing heterogeneity among agents. It assumes that the high-skilled workers are probably more confronted with this migration problem than low-skilled workers. The reason is that high-skilled workers often acquired specialized skills and the demand for these skills varies across space and time. The existence of high migration costs would therefore harm high-skilled workers more than low-skilled ones. This would consequently discourage investments in specialized human capital that is usually acquired through tertiary education. The existence of these migration costs reduce the size of labor reallocation on the high-skilled market relatively to the low-skilled market where workers can remain in their region to search for an equivalent job. In other words, there are proportionally less matches dissolved on the high-skilled market than in the low-skilled market. But these particular matches are also the ones which would be the most hit by employment protection, that represent not only insider gains for the workers but also a direct cost at separation. This means that employment protection would have a more damaging effect on the low-skilled market than on the high-skilled market. Therefore, employment protection could be considered as a possible policy to stimulate investments in specialized human capital in countries where there are high migration costs. The problem of such a policy is that it would probably be not be politically feasible as low-skilled workers would oppose to it. Similarly, direct subsidies to education have a similar effect on specialized human capital accumulation. Hence, this could explain why European countries devote much more public funds at tertiary education than the United States does. It would also suggest that given the high exogenous migration costs present in Europe, employment

protection is a good thing to stimulate investments in specialized human capital.

Chapter 5 analyzes the benefits of employment protection for the quality of an employment relationship. Indeed, we see that even in the US, contracts are designed with specifications on the termination terms, i.e. that the effective employment protection is larger than the legal employment protection (see Nickell and Layard (1999)). So what this means is that both the firm and the worker may find it profitable to have a contract that protects the relationship against negative shocks. Why is the question addressed in Chapter 5. Employment protection is a way for the firm to commit to the worker that it will not fire him in case of (not too) negative shocks. It guarantees that the relationship will last longer (in expectations) than without employment protection legislation. A longer relationship is interesting for the firm if the worker can improve the quality of the relationship by making match-specific investments, i.e. investments that are sunk and that do not mean nothing for other employment relationships. Of course employment protection is also a direct cost at separation and, therefore, discourages job creation. The conclusion of Chapter 5 is that there is an *optimal* (from a welfare point of view) level of employment protection. Employment protection makes sense if one believes that there are potential match-specific investments than can be made by the worker in order to improve the quality of the match, and that one cannot design a contract in advance linking a wage payment to the investment. Furthermore, Chapter 5 shows that this optimal level of employment protection also depends on exogenous characteristics of the workers, such as their education level. Hence, it is optimal to protect high-skilled workers more than low-skilled workers. In conclusion, Chapter 5 establishes a two-way relationship between human capital and employment protection. First, employment protection favors human capital investments on-the-job and second, the education level (or human capital of the worker at the beginning of the employment relationship) determines the optimal level of employment protection.

Table 1.14 presents an overview of the organization of the last three Chapters.

Effects on →	Employment protection (political support, optimal)	Migration intensity	Human capital (HC) acquisition
Employment protection	/	- Ch. 3	+ Ch. 4. HC off-the-job + Ch. 5. HC on-the-job
Migration opportunities	- Ch. 3 (political support)	/	+ Ch. 4.
Human capital (education levels)	+ Ch. 4 (political support) + Ch. 5 (optimal)	+ Ch. 4	/

Table 1.14: Organization of Chapters 3, 4 and 5

The broad message of this thesis is that institutions play an important role in determining the labor market performance and the welfare of societies. Furthermore, these institutions interact with each other and with essential characteristics of the countries, such as the cultural and economic homogeneity, the mobility costs within and between countries, etc. There is therefore not one successful recipe but a careful and clever design of the institutional framework, taking these interactions into account. Hence, employment protection has often being blamed for the poor labor market performance in European countries. However, this dissertation shows that it can be potentially very valuable. Chapters 3 and 4 suggest that the institutions should be shaped to the characteristics of the countries or the type of individuals, i.e. that maybe employment protection should differ for example across levels of education.

This dissertation has been written in such a way that all Chapters can be read independently of each other. However, given that the themes treated in the different Chapters are very much related to each other, the reader of the complete manuscript will find some overlap between them. The author apologizes for this inconvenience.

Chapter 2

Institutions and Unemployment Rates in OECD Countries: An Empirical Analysis

This Chapter is based on two papers: "Does the Recent Success of some OECD Countries Lie in the Clever Design of their Labor Market Reform" (Belot an Van Ours (2000)) and "Institutions and Labor Markets Institutions: An Empirical Analysis" (Belot and van Ours (2001))[1].

2.1 Introduction

The relationship between unemployment and labor market institutions has been the topic of several studies. In their overview Nickell and Layard (1999) conclude that the main institutions influencing unemployment are unions and social security systems. In order

[1]The authors of the related papers would like to thank Jan Boone, André Hoogstrate, Michael Krause, Steve Nickell, Arthur van Soest for their comments on a previous version of the paper, and Shin'ichi Fukuda, Yuji Genda, and participants to seminars at OSA, CentER (Tilburg, the Netherlands), the Institute for Advanced Studies (Vienna), the University of Toulouse, and participants to the conferences of the EEA in Lausanne, of the EALE in Regensburg and of the EALE-SOLE and to the December 2000 NBER-CEPR-TCER conference in Tokyo for stimulating comments. They also thank David Blanchflower and Andrew Oswald for making their data on home ownership rates available.

to reduce unemployment, governments should encourage product market competition to eliminate the negative effect of unions and governments should link reforms of unemployment benefit systems to active labor market policies in order to move people from welfare to work. Their overview is based on a number of cross-country studies like for example Nickell (1998), Scarpetta (1996) and Daveri and Tabellini (1997).[2]

The search for relationships between labor market institutions and unemployment is motivated by the fact that across countries there are substantial differences in the level and evolution of unemployment. As shown in Table 2.1 in 2000 the unemployment rates range from below 4% in Austria, the Netherlands, Norway and Switzerland to above 9% in Finland, France and Italy. On average unemployment rates have increased from a low 2-3% in the 1960s to around 7% in the 1980s and 1990s. Here too, there are also substantial differences across OECD countries that are illustrated in Table 2.1, which compares the situation in the early 1960s, the early 1980s and the late 1990s. Countries like Austria, Japan and Norway have had a low - though slowly rising - unemployment rate over a period of 40 years. Countries like Finland, Germany, France, New Zealand and Sweden have experienced a strong rise in unemployment over this period. Countries like Australia and Canada have an unemployment rate in the early 1980s that was substantially higher than in early 1960s, but in the late 1990s the unemployment rate is about the same as in the early 1980s. Finally there are countries like Denmark, Ireland, The Netherlands, United Kingdom and the United States where the unemployment rate in the early 1980s was much higher than in the early 1960s, but the unemployment rate in the late 1990s was much lower than in the early 1980s. So, within this context of globally rising or at most stabilizing unemployment rates, in recent years some countries have managed to reduce their unemployment rates substantially. Examples are the United Kingdom (12% in 1986, 5.5% in 2000), Ireland (17.8% in 1987, 4.2 in 2000), the Netherlands (12.2% in

[2]Recently, Garibaldi and Mauro (2001) did a cross-country analysis claiming that high employment growth is related to low taxation and low dismissal costs.

1984, 2.8% in 2000), Denmark (10.1% in 1993, 4.7% in 2000) and the USA (7.5% in 1992, 4.0% in 2000).

It could be that some countries have a better labor market performance than other countries because they have a particular type of institutions or they changed some of the institutions in a favorable way. If this is the case, then countries with high unemployment rates could learn from successful countries by imitation. Interactions between institutions have been studied by Calmfors (1993), Coe and Snower (1997) and Elmeskov et al. (1997)[3]. Blanchard and Wolfers (2000) argue that similar economic shocks can have very different effects on unemployment depending on the labor market institutions. Bertola et al. (2002) find a similar interaction between shocks and labor market institutions. Fitoussi et al. (1998) underline that all recently successful countries have in common the implementation of a set of comprehensive reforms.

The objective of this Chapter is to investigate the existence of complementarities in more detail. It presents a stylized theoretical model that illustrate the mechanisms through which institutions interact and influence unemployment. It investigates whether there is empirical evidence on the existence of complementarities, based on data from eighteen OECD countries over the period 1960-1995.

The Chapter is structured as follows. Section 2.2.1 presents a theoretical model of employment and wage determination. Section 2.3 discusses the labor market performances of OECD countries and relate these in a stylized way to labor market institutions. Section 2.4.1 presents the results of the empirical analysis. Section 2.5 concludes.

[3] A recent study by Checchi and Lucifora (2002) considers interactions between labor market institutions in the sense that they perceive institutions such as employment protection as substitutes for union services.

	(1)	(2)	(3)	(4)	(5)	(6)
	2000	1960/64[a)]	1980/84	1995/99	(3)-(2)	(4)-(3)
Australia	6.6	2.6	7.4	8.1	4.7	0.7
Austria	3.7	2.2	3.2	4.2	1.0	1.1
Belgium	7.0	2.2	11.5	9.3	9.3	-2.2
Canada	6.8	5.6	9.8	8.9	4.2	-1.0
Denmark	4.7	1.8	9.7	6.4	7.9	-3.3
Finland	9.8	1.4	5.2	13.4	3.9	8.2
France	9.5	1.4	8.2	11.9	6.8	3.7
Germany	8.1	0.7	6.1	9.0	5.4	2.9
Ireland	4.2	5.0	11.8	9.6	6.8	-2.2
Italy	10.5	5.1	8.8	11.9	3.7	3.1
Japan	4.7	1.4	2.4	3.7	1.0	1.3
Netherlands	2.8	1.1	10.1	5.1	9.0	-5.0
Norway	3.5	1.1	2.6	4.1	1.5	1.5
New Zealand	6.0	0.1	4.2	6.7	4.1	2.5
Sweden	5.9	1.6	2.8	8.9	1.3	6.1
Switzerland	3.0[b)]	0.0	0.6	4.8	0.5	4.2
United Kingdom	5.5	1.5	9.6	7.3	8.1	-2.3
United States	4.0	5.7	8.3	4.9	2.6	-3.4
Unweighted Average	6.4	2.3	6.8	7.7	4.5	0.9

a) Five-year averages, *b*) 1999

Table 2.1: Unemployment rates

2.2 Labor markets and institutions, theory

2.2.1 The model

The model proposed here is simple and fairly standard. It shows how labor market institutions may interact with each other, stressing their role in bargaining and employment setting. The institutions included here are the labor taxes, firing costs, the unemployment benefit system, and the degree of coordination and centralization in the bargaining process[4]. The analysis starts with the traditional right-to-manage model of wage bargaining (Nickell and Andrews (1983)). The wages are set so as to maximize the relative rents of both actors. The model follows closely the line of reasoning in Layard, Nickell and Jackman (1991) and Booth (1995).

The economy is constituted of N perfectly symmetric firms ($i = 1, 2...N$) and N unions. Each of the unions negotiates wages in one firm and bargains independently of the other unions[5]. Time is discrete but only steady state conditions are considered. Firms determine the level of employment given the negotiated wage. The actors are perfectly informed about firm's behavior, in particular of the labor demand function. Since bargaining occurs before, the actors consider the level of employment in the firm as endogenous in the bargaining process. The first logical step consists in describing the firm's behavior. Wage bargaining occurs at different levels (firm, sector, national). What the bargaining partners need to predict is the behavior of a representative firm included in the bargaining. Indeed, when bargaining at a more centralized level, unions and firms know that all the firms included in the same negotiation will set the same wages. Consequently, what matters here is the conditions in which a representative firm included in the bargaining operates when determining its labor demand.

[4]Because of lack of data some important institutions like for example the minimum wage and active labor market policies are ignored.

[5]The case where $N = 1$ represents the situation in which wage negotiations are centralized.

Labor demand

Capital is ignored and it is assumed that a representative firm i has a production function with a Cobb-Douglas specification, $Y_i = L_i^{\kappa}$, where Y_i is the production level, L_i the employment level[6] and κ is the parameter of the production function, $\kappa \in]0,1[$. The inverse demand function faced by the firm on the product market is given by $P_i = Y_i^{-\eta}$, where P_i the product price of firm i and $\eta \in [0,1]$ is the degree of monopoly power on the product market where firm i operates[7]. Hence, when bargaining at the decentralized level, a representative firm faces a fierce competition with all the other firms not included in the bargaining. On the contrary, when bargaining at a more centralized level, the representative firm faces less competition from the firms not included in the bargaining. Indeed, since the level of bargaining is defined with respect to the proximity in terms of product markets, bargaining at the sector level includes by definition the most direct competitors and bargaining at the national level include all national competitors. Hence, a decentralized bargaining level will be featured by $\eta = 0$, and more centralized levels by $\eta > 0$. Introducing a product market power leads to rents that can be shared between firms and unions. Separations of workers and firms occur only when firms take a unilateral firing decision. They incur a cost per fired worker that is proportional to the wage. The proportion factor is denoted c_f. Firms are subject to negative shocks. Old jobs become less productive. Firms then fire workers when a new job is sufficiently productive to cover the firing cost associated with separation. For simplicity, the proportion q of workers fired at each period is independent of the employment level.[8]

[6] We normalize the labor force to 1. The employment level is then also the employment rate. The unemployment rate is simply its complement $(1 - L_i)$

[7] η is the absolute elasticity of this inverse demand function. $\eta = 0$ corresponds to the perfect competition case.

[8] Jobs are subject to productivity shocks. Hence, the productivity of all existing jobs falls each period by a factor δ. For any given wage, it is more profitable for firms to fire some workers, pay the firing cost and hire new workers. It is profitable for the firm to do so until the marginal productivity of the last new job is sufficient to cover the productivity loss and firing cost by firing an old worker. This implies that when the firing cost is high, the firm waits longer to fire a worker, so that the productivity loss is smaller.

The profits of firm i are equal to $P_iY_i(L_i) - w_iL_i(1 + qc_f + \tau)$, where r is the exogenous discount rate, w_i the negotiated (net) wage which is exogenous to the employment decision of the firm, τ the labor tax rate and qfw_i is the firing cost per worker. The first order condition is $L^{-\mu} = \frac{w(1+qc_f+\tau)}{(1-\mu)}$, where $\mu = 1 - \kappa(1-\eta)$ can be interpreted as the effective degree of monopoly power. *Labor demand* can then be written as follows:

$$L = \left(\frac{1-\mu}{w(1+qc_f+\tau)}\right)^{\frac{1}{\mu}}, \tag{2.1}$$

This is a traditional labor demand function, depending negatively on the wage. Institutional parameters also determine labor demand. Labor taxes τ and adjustment costs qc_f reduce labor demand and the degree of monopoly power decreases the labor demand at any wage. The institutional parameters also determine the slope of the labor demand curve. Labor taxes, the firing cost and the degree of monopoly power unambiguously reduce the labor demand response to changes in the wage.

Wage bargaining

Let us now turn to the wage bargaining process. The chronology in decisions is the following. At the beginning of each period wage bargaining takes place, when a wage agreement has been reached, firms start producing and paying wages and at the end of the period firms incur firing costs (Cahuc and Zylberberg (1994)).[9] Wage bargaining is

Firms find it profitable to replace a proportion q of workers such that $\delta\frac{\partial Y_i}{\partial L_i(1-q)} = w_i(1-c_f)$, where δ is the productivity shock parameter. Therefore, $q = 1 - \left(\frac{\delta}{1-c_f}\right)^{\frac{1}{\mu}}$, which has as interesting implication that the stricter the employment protection regulation (represented by the parameter c_f) the smaller the proportion of workers fired every period. Although this definition is quite mechanical, it features a well-known empirical fact that countries with more flexible employment protection regulation experience larger turnovers.

Furthermore, $\frac{\partial(qc_f)}{\partial c_f} < 0$, i.e. an increase in the firing cost unambiguously increases the total adjustment costs.

[9] In case of failure, workers are fired immediately at no cost. They get a chance of being employed in another firm or are unemployed for that period at least. When the bargaining procedure failed, firms do not produce anything.

based on the maximization of rents. Both actors are assumed to be risk neutral[10], i.e. their expected utility corresponds exactly to the expected monetary payments and costs they incur.

The bargaining outcome is the solution to the following Nash bargaining program:

$$w_i = \arg\max_{w_i} \left(UR_i\right)^{\beta} \left(FR_i\right)^{1-\beta}, \tag{2.2}$$

where β is the relative bargaining power of the union in firm i, UR_i and FR_i are respectively the union and firm rents. The rents of a union are equal to the difference between the utility in case of agreement and the fall-back utility level. In case of bargaining failure, the firm does not produce nothing and separates from all workers at no cost. Workers then get the opportunity to be employed in another firm (except in the centralized case) or become unemployed. The utility of the union in case of agreement

$$UR_i^A = L_i W_i + (1 - L_i)(\sum_{j \neq i} L_j W_j + (1 - \sum_{j \neq i} L_j)U), \tag{2.3}$$

where the value of working $W_i = w_i + \frac{1}{1+r}\left((1-q)W_i + qU\right)$. In each period, the worker benefits from the wage paid by the firm. Then, with a probability $(1-q)$ he is fired and becomes unemployed. The value of being unemployed U is defined as $U = b + \frac{1}{1+r}(\sum_i p_i W_i + (1 - \sum_i p_i)U)$. Unemployed workers receive an unemployment benefit equal to a fixed amount b[11]. Then, with an exogenous probability p_i they get a job next period at firm i. The latter probability is exogenous from the unemployed's perspective. In general equilibrium, the flows into unemployment equal the flows out of unemployment. The probability of getting

[10] The assumption of risk neutrality can seem rather strong. However, unions are organizations composed of a large number of members and, therefore, it is likely that they find some way to insure the individuals (risk averse) internally. Furthermore, risk aversion is often introduces in models where agents make decisions about savings (consumption smoothing), which is definitely beyond the scope of this paper. The reason why risk neutrality is assumed here is to make the model tractable.

[11] One could easily assume that unemployment benefits are linked to average wages. They could be of the following form: $b = \rho\widetilde{w} + c$, where ρ and c are fixed parameters and $\widetilde{w}$ is the average wage in the economy. This would not change the implications of the model.

a job is consequently linked to the firing rate q and the employment level $L = \sum_i L_i$. The utility of the union in case of no agreement $UR_i^F = \sum_{j \neq i} L_j W_j + (1 - \sum_{j \neq i} L_j)U$.

Union rents are then simply

$$UR_i = UR_i^A - UR_i^F = L_i \left[W_i - \left(\sum_{j \neq i} L_j W_j + (1 - \sum_{j \neq i} L_j)U \right) \right], \tag{2.4}$$

Expression (2.4) shows that unions care about employment in the firm they represent and about the relative welfare of a worker in firm i. The latter depends on the value of working in the given firm and on the value of the alternatives (working in another firm or being unemployed).[12]

The rents of the firm are defined as follows. Assuming that in case of bargaining failure, there is no production, nobody is hired[13] but the firm still expects a profit in the future, the rents of the firm are equal to:

$$FR_i = P_i Y_i(L_i) - w_i L_i(1 + qc_f + \tau), \tag{2.5}$$

Plugging the expressions for the union rents and the firm rents in the Nash bargaining, the following expression for the wage in firm i w_i is derived:

$$w_i = (\frac{\beta\mu}{1-\mu} + 1)(\sum_{j \neq i} L_j w_j + (1 - \sum_{j \neq i} L_j)b + \phi_i), \tag{2.6}$$

where $\phi_i = -(1-q)(W_i - \sum_{j \neq i} L_j W_j)$. Expression (2.6) immediately shows that the wage in firm i is set as a mark-up on the alternative income (wage in the other firm and unemployment benefit). It is also clear that this mark up depends on institutional parameters.

The following *bargaining condition* is expressed as follows:

$$w = b \left(1 - \frac{\beta}{\xi} \right)^{-1}, \tag{2.7}$$

[12] Note that in the centralised case (superscript C), the union rents can be expressed as $UR_i^C = L_i(W_i - U)$. This expression results from the absence of alternatives other than unemployment both in case of non-employment in firm i or in case of bargaining failure.

[13] In case of bargaining failure, all workers are assumed to be fired at no cost.

where $\xi = \left(\beta + \frac{1-\mu}{\mu}\right)\left(1 - \frac{L^*(N-1)}{N}\right)\left(\frac{1+r}{r+\frac{q}{1-L^*}}\right)$. Equation (2.7) establishes a positive relationship between the bargained wage and the employment level by two channels. First, the higher the employment level the larger the number of employment alternatives the workers have, at any given N, and so the better the bargaining position of the unions. Second, the higher the employment level, the higher the probability unemployed find a job next period. This again improves the bargaining position of workers.

The institutional framework determines the relative bargaining position of the workers. The better their relative bargaining position the higher the bargained wage. Hence, the unemployment benefit b, the number of other firms N bargaining independently, the degree of monopoly power of the firms on the product market μ and the proportion q of workers fired each period improve the bargaining position of unions and therefore push the wage up, at any employment level. With respect to the latter parameter q, one should remind that it is negatively correlated with the strictness of the employment protection regulation. The story is then that a stricter employment protection weakens the bargaining position of the unions, by improving the future rents of workers in the current period.[14]

2.2.2 Complementarities

The equilibrium of the economy is determined by the labor demand (2.1) and bargaining condition (2.7). Formally, there are two functions with two endogenous variables:

$$\begin{aligned} L &= g(w, \Psi) \\ w &= h(L, \Theta) \end{aligned}$$

where Ψ and Θ are vectors of institutional parameters.

These two functions are traditionally represented in a two-dimension space (w, L). The labor demand is then downward-sloping and the bargaining curve is upward sloping.

[14] Workers do not receive any severance payment. It would be straightforward to show that any payment to the workers would weaken further their bargaining position.

This simple framework is useful to understand the mechanisms of complementarities. g_w is negative and h_L is positive.[15] Let us denote by χ any institutional parameter (present in the at least one of the vectors Ψ or Θ). The objective is to predict its net effect on employment and identify the institutions determining the magnitude of the effect. The overall effect of a change in institutions on equilibrium employment is the following:[16]

$$L_\chi = \frac{g_w h_\chi + g_\chi}{1 - g_w h_L} \tag{2.8}$$

The effects of various reforms on employment depend on four derivatives: g_χ is a the "labor demand shifting effect", $g_w h_\chi$ is a "bargaining shifting effect", $(1 - g_w h_L)$ is an "adjustment effect", which depends on the slopes of the two curves.

What is particularly interesting here is that these three effects depend on the institutional framework as a whole. Let us distinguish between interactions within the system of financial incentives, labor taxes, and unemployment benefits and interactions within the structure of union bargaining. The focus is on two interactions between the level of bargaining and institutions determining what could be called the "insider power" of the workers: the employment protection legislation on the one hand and the union density on the other hand. These interactions play an important role in explaining the differences in unemployment rate paths.

Let us first start with the effect of an increase in the replacement rates. An increase

[15] where f_x is the first derivative of the function f with respect to x.

[16] We have

$$\begin{aligned} L &= g(w, \chi), \\ w &= h(L, \chi), \end{aligned}$$

Hence, the first derivatives are:

$$\begin{aligned} L_\chi &= g_w w_\chi + g_\chi, & \text{(a)} \\ w_\chi &= h_L L_\chi + h_\chi, & \text{(b)} \end{aligned}$$

Substituting (b) in (a) and re-arranging leads to expression (7). For the equilibrium wage one has: $w_\chi = \frac{h_\chi + h_L g_\chi}{1 - g_w h_L}$

in the replacement rate shifts the wage curve upwards causing the wage to increase and employment to fall. The magnitude of the shift depends on the institutional framework. Since labor taxes and replacement rates are highly positively correlated, two situations are compared: a situation in which a country has high taxes and high replacement rates with a situation in which a country has low taxes and low replacement rates. Conditional on the demand curve a equal sized shift of the bargaining curve will lower employment more in case of low tax rates due to the curvature of the labor demand curve (note that $\frac{\partial^2 L}{\partial w^2} < 0$). However, the size of the shift may also depend on the level of the taxes. If the shifting effect is sufficiently large, the (negative) employment effect is larger under a "generous social security system". So, on the basis of theoretical considerations it is impossible to predict whether the reduction of employment due to an increase in benefits under high taxes is larger, smaller or equal to a situation with low taxes.

Let us now turn to the effect of an increase in union density, as a function of the bargaining level. A decentralized bargaining system is characterized by a relatively low bargaining power (since the monopoly power is close to 0). This means that the wage curve is relatively flat. On the other hand, the labor demand curve is also flat since a low degree of monopoly power increases the labor demand's response to wage changes. A centralized bargaining system has also a relatively low bargaining power but the corresponding labor demand curve is more steep since the monopoly power is high. This implies that a shift in the wage curve is likely to have the largest employment effects in the decentralized case, where the "adjustment effect" is the smallest. So, an increase in union density is likely to have the largest impact in the decentralized case.

Finally, let us consider the effect of an increase in the employment protection legislation, i.e. an increase in the firing cost. This shifts both curves. First, the wage curve shifts downwards (i.e. the bargaining position of the workers falls). The employment effect is likely to be the largest when the labor demand curve is the most flat (i.e. in the decentralized case). Second, the labor demand shifts to the left. This has a negative

effect on employment. The overall effect is ambiguous but the flatter the curves are the larger the employment effects are likely to be.

All in all, with respect to the direct employment effect of institutional changes it is easy to derive predictions from the theoretical model. Higher taxes and higher union density cause labor demand to fall due to the shift of the labor demand curve, higher benefits cause labor demand to fall due to the shift of the bargaining curve. Only for the relationship between firing costs and employment the situation is not clear. When it comes to interactions between institutions it is more difficult to make clear predictions from theory. The empirical study should enlighten on which effect dominates.

2.3 Unemployment and institutions; developments

The empirical study of eighteen OECD countries is based on five-year averages over the period 1960-1995. The countries are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Norway, New Zealand, Sweden, Switzerland, United Kingdom and United States of America. The introduction has already given a brief description of relevant developments in the unemployment rates. This descriptive information is expanded here.

Table 2.2 compares the unemployment rates in 1983 - the year in which the average unemployment rate was at its average - with 2000, the last year of which data were available. The table shows to which extent countries changed their relative position by comparing countries below and above average unemployment rates in both years. As shown Australia, Belgium, Canada, France and Italy had an above average unemployment rate in both years. Austria, Japan, Norway, New Zealand, Sweden and Switzerland on the other hand had a below average unemployment rate in both years. Finland and Germany faced a deteriorating position with a below average unemployment rate in 1983 and an above average unemployment rate in 1999. Finally, Denmark, Ireland, the Netherlands,

		2000	
		Above average	Below average
1983	Above average	Australia, Belgium, Canada, France, Italy	Denmark, Ireland, Netherlands, UK, USA
	Below average	Finland, Germany	Austria, Japan, Norway, New Zealand, Sweden, Switzerland

Table 2.2: Relative positions in terms of unemployment rates

Change in unemployment	Countries
Rise 4% or more	Finland, France, Sweden, Switzerland
Rise 0-4%	Austria, Germany, Italy, Japan, Norway, New Zealand
Fall 0-4%	Australia, Belgium, Canada
Fall 4% or more	Denmark, Ireland, Netherlands, UK, USA

Table 2.3: Change in unemployment rate 1983-2000

UK and USA are the countries that successfully reduced their unemployment rate going from an above average to a below average unemployment rate. Note that if one would compare five-years averages of the period 1980/85 and 1995/99 the table would look the same apart from one country. Ireland would then be in the top-left position indicating that their unemployment rate was above average all the time. This is caused by the fact that the recovery of the Irish economy is a quite recent phenomenon.

Table 2.3 gives a different overview of developments by illustrating absolute changes in the unemployment rate between 1983 and 2000. At the one extreme in Finland, France, Sweden and Switzerland the rise in unemployment rate was 4%-points or more, at the other extreme in Denmark, Ireland, the Netherlands, UK and USA the fall in unemployment rate was 4%-points or more. The latter group was also in the upper right column of Table 2.3. This group is therefore considered as the group of the successful countries in terms of their large absolute and relative reduction in their unemployment rates.

Now, let us turn to the variables that reflect the institutional framework. The the-

oretical model suggests that the unemployment rate depends on various institutional parameters, which are proxied by indicators[17] in the following way. The union bargaining power is proxied by union density, the level of bargaining is measured by the degree of centralization of the economy (privileged level of bargaining: firm, industry or national). The indicator for labor taxes, is the sum of the direct tax rate and the employment tax rate, measuring the fiscal pressure respectively on workers and employers. The generosity of the unemployment benefit system is proxied by a summary indicator of the replacement rate, averaging the replacement rates in various time, family and working conditions. Firing costs are summarized by an employment protection summary indicator that consists of three types of employment protection indicators: protection of open-end contracts, restrictions on the use of fixed-term contracts and restrictions on the use of temporary work agencies. These three indexes have been built following a method described in the appendix, consisting in grading regulations in the field of working contracts.[18]

Table 2.4 gives a summary overview of the development of the average values of these indicators[19]. The first column of this table shows the evolution of the average unemployment rate for each of the five years periods considered. The average unemployment rate was roughly constant in the 1960s and the early half of the 1970s. Then there was an increase, but since the beginning of the 1980s not much happened on average. As shown in the second column of Table 2.4, taxes continuously increase from 23.1% in the early 1960s to 39.4% in the early 1990s. The average replacement rate, shown in the third column, also increases continuously from 16.2% in the early 1960s to 27.5% in the early 1990s. The fourth column shows that average employment protection did not change

[17] Details on these indicators are presented in the appendix.

[18] The introduction of additional labor market institutions like union coverage or the existence of a minimum wage into the analysis was considered. However these institutions do not have sufficient variation over time and across countries once calendar time and country fixed effects are introduced.

[19] Ur: Standardized unemployment rate, Tax: Overall average labor tax rate, Rrate: Gross replacement ratio, EPL: strictness of the employment protection legislation, Udens: Union density, Cen: Centralization index

	Ur (%)	Tax (%)	Rrate (%)	EPL (%)	Udens (%)	Cen
1960/64	2.3					
		23.1	16.2	43.2	43.6	2.00
1965/69	2.2					
		26.8	17.0	43.4	43.7	2.00
1970/74	2.6					
		31.3	19.6	44.3	44.4	2.00
1975/79	4.5					
		35.4	24.0	44.4	46.3	1.99
1980/84	6.8					
		37.3	25.7	44.2	47.3	1.94
1985/89	7.1					
		38.6	27.1	40.4	44.7	1.86
1990/94	8.1					
		39.4	27.5	39.7	42.6	1.77
1995/99	7.7					

Table 2.4: Five-year averages of institutional indicators

much until the early 1980s to decline substantially in the remainder of the 1980s. The fifth column of Table 2.4 shows the average union density, which was slowly increasing from 43.6% in the early 1960s to 47.3% in the early 1980s and then decreased to 42.6% in the early 1990s. Finally, the last column of Table 2.4 shows that the average level of centralization decreased since the second half of the 1970s.

Now, let us turn to the institutions as potential determinants of the recent developments. What one wants to know is if there is any relationship between institutions and the development of the unemployment rates. In this respect, differences between countries may be caused by time invariant differences in institutions or by the differences in the evolution of institutions.

Table 2.5 gives an overview of the value of the different institutional indicators in the first half of the 1980s[20]. Tax rates with an average value of 37% vary from a low 19% in Australia to a high 57% in Sweden. Replacement rates with an average value of 25% vary from a low 1% in Italy to a high 56% in Denmark. Employment protection with an average value of 44% (on a scale from 0 to 100) vary from a low 0% in the USA to a high

[20] Ur: Standardized unemployment rate, Tax: Overall average labor tax rate, Rrate: Gross replacement ratio, EPL: strictness of the employment protection legislation, Udens: Union density, Cen: Centralization index

	Tax (%)	Rrate (%)	EPL (%)	Udens (%)	Cen
Australia	19	23	3	47	2
Austria	40	27	39	55	2
Belgium	46	45	70	55	2
Canada	26	27	11	36	1
Denmark	31	56	37	75	2
Finland	46	21	71	70	3
France	47	29	70	17	2
Germany	41	29	79	36	2
Ireland	20	30	12	56	2
Italy	48	1	82	47	1
Japan	24	9	68	30	1
Netherlands	51	48	45	34	2
Norway	38	29	50	57	3
New Zealand	-	30	33	55	2
Sweden	57	7	93	81	3
Switzerland	33	14	11	30	2
United Kingdom	32	23	20	49	2
United States	35	14	0	22	1
Unweighted Average	37	26	44	47	1.9

Table 2.5: Averages of institutions 1980-84

93% in Sweden. Average union density is 47%, with a range from 17% in France to 81% in Sweden. Finally, the last column of Table 2.5 shows the levels of centralization in the early 1980s, the average level being equal to 1.9 (on a scale from 1 to 3).

At first sight, there is no apparent link between institutions and unemployment rates in the different countries. Still, some interesting patterns can be sketched out. The group of countries with a large increase in their unemployment rates since the early 1980s is characterized by a relatively high tax burden, Switzerland being the exception. The successful countries have a relatively low tax burden, with the exception of the Netherlands. What is surprising is that countries that managed to reduce their unemployment rates

over the last decade also have relatively high replacement rates, the exception being the UK and USA. At the other extreme, countries with a sharp rise in their unemployment had low replacement rates in the early 1980s, the exception being France. Furthermore, it is clear that except for Switzerland the group of countries that experienced a big increase in their unemployment rate have a relatively high indicator of employment protection. On the other hand the group of successful countries all have employment protection below average. The relationship between the change in unemployment rates and union density is less clear. Both in the group of countries with a big increase in their unemployment rate and in the group of successful countries there are high and low union density countries. With respect to the degree of centralization there are no obvious differences between the groups of countries.

Of course, this descriptive information on cross-sectional differences between institutions does not tell the whole story. Instead of comparing differences between institutions one by one a multivariate analysis would be better. And, averages of institutional indicators can be misleading because they do not tell nothing about the evolution of institutions. It may be that the exact level of an indicator variable is not important but the change is. Table 2.6 shows changes in institutional indicators from the early 1980s to the early 1990s[21]. If one relates these changes to the development of the unemployment rates then there are some indications of the relevance of these changes but for every indicator there are exceptions. The group of countries with a strong increase in their unemployment rates had an increase in their taxes and their replacement rates (the latter with the exception of Finland, which had a slight decrease in the replacement rate). In the group of successful countries taxes went down a lot in the Netherlands and the UK, but not in the other countries in this group. In the UK and the USA the replacement rate went down, but not in the other countries. Employment protection went down both in the group of countries

[21] Ur: Standardized unemployment rate, Tax: Overall average labor tax rate, Rrate: Gross replacement ratio, EPL: strictness of the employment protection legislation, Udens: Union density, Cen: Centralization index

	Tax (%)	Rrate (%)	EP (%)	Udens (%)	Cen
Australia	-4	3	9	-9	-1
Austria	-1	2	0	-10	0
Belgium	7	-4	-6	-3	0
Canada	6	1	0	0	0
Denmark	7	7	-23	-2	0
Finland	8	-1	0	4	-1
France	6	9	-15	-8	0
Germany	1	-1	-17	-4	0
Ireland	3	0	0	-6	0
Italy	8	2	-7	-8	1.2
Japan	5	1	-14	-5	0
Netherlands	-9	1	-5	-8	0
Norway	0	10	0	0	0
New Zealand	-	1	0	-13	-0.8
Sweden	1	0	0	6	-0.6
Switzerland	3	12	0	-3	0
United Kingdom	-5	-5	1	-11	-1
United States	1	-2	0	-6	0
Unweighted average	2	2	-4	-4	-0.1

Table 2.6: Change in institutions: 1980-84 - 1990-94 (five-year averages)

that faced a big increase in unemployment as well as in the group of successful countries. For every successful country union density went down, while except for the UK nothing happened with the level of centralization.

In conclusion, this descriptive approach of the institutional frameworks gives an intuition of why some countries were more successful than others were. The reductions in the tax burden and replacement rates seem to be important ingredients. Furthermore, the reduction in the union bargaining power is present in most of the successful countries, combined with a deeper reform of the entire bargaining system. It also seems that most of the successful countries changed a lot in the same time, the two most obvious

examples being The Netherlands and United Kingdom. The theoretical ideas seem to be supported by the stylized facts. The empirical study investigates more closely the mechanisms through which success and failure happened.

2.4 Empirical analysis

2.4.1 Econometrics of panel data

In order to investigate the effects of labor market institutions on economic performance, the empirical labor economist often uses panel data sets. The panel used in this dissertation is based on macro data, and is therefore different from traditional micro data sets, since the number of time periods is larger than the number of individuals. The countries can be referred to as "individuals" j , $j = [1, 18]$ and the years as time periods t, $t = [1960, 1995]$. One should therefore be careful when using techniques designed for panels with an infinite number of individuals and a short number of time periods. Furthermore, the model is probably more relevant when specified dynamically. The estimation of a dynamic model based on this kind of data set is also subject to potential biases. As Swamy (1971) underlines it, "the problem of estimating an economic relationship from the combined time series and cross-country data poses a serious challenge to econometricians". This was written in 1970. Since then, an important work has been done. Pesaran and Smith (1995) offer a good overview of the problems that can arise when estimating long run relationships with this type of panel data set.

What has usually been done in the literature is to estimate the effects of institutions using the following econometric specification:

$$u_{j,t} = \alpha_j + \alpha_t + \beta_p y_{i,t} + \gamma_k Z_{k,,j,t} + \varepsilon_{j,t}, \tag{2.9}$$

where α_i and α_t are country-specific and time-specific effects, $y_{i,t}$ is a driving macroeconomic variable (GDP growth, change in inflation, etc.) and Z_k is an institutional indicator.

Two basic assumptions are necessary.

Assumption 1. $E\varepsilon_i = 0$ and $E\varepsilon_i\varepsilon_j = \sigma_i^2$ if $i = j$, $= 0$ if $i \neq j$.

Assumption 2. $Ex_{it}\varepsilon_{it} = 0$,

where $x_{i,t} = \{y_{i,t}, Z_{k,j,t}\}$.

The second assumption can be tested by the Hausman test. Suppose that the country-specific effects are uncorrelated with the independent variables (such as the institutions), then one may consider them as part of the random term. If this is not true, one should consider them as "fixed effects", i.e. responsible for country-specific intercepts of the regression "lines".

A third important assumption made when estimating this model is that the coefficients of the institutional indicators and the macroeconomic variable are equal over time and across individuals, i.e. that the coefficients are homogenous. Obviously the unrestricted specification that would allow for different coefficients both across time and individuals would not make sense as there would be as many coefficients to be estimated as there are data points. However, one can test for the homogeneity of these coefficients across countries or over time separately and the null hypothesis (coefficient homogeneity) is always rejected. This is the point where the theory comes in. Indeed, the theory suggests that the effect of a particular institution is likely to vary according to the rest of the institutional framework. Hence, the heterogeneity problem can be partly solved by introducing interaction variables between institutions.

Concerning the macroeconomic variable, the change in inflation is chosen (cfr. Nickell, 1998), so as to explain deviations of the unemployment rate from its natural non-accelerating level.

Consequently, the empirical analysis regresses the standardized unemployment rate in country j at time t, $u_{j,t}$ on k institutional variables denoted $Z_{k,j,t}$ and the change in inflation denoted by $\Delta^2 p_{j,t}$. To simplify notation it is assumed that $k = 2$. The most

general model can be specified as follows:

$$u_{j,t} = \alpha_j + \alpha_t + \beta_p \Delta^2 p_{j,t} + \gamma_1 Z_{1,j,t} + \gamma_2 Z_{2,j,t} + \gamma_{12} Z_{1,j,t} Z_{2,j,t} + \varepsilon_{j,t}, \tag{2.10}$$

where there error term $\varepsilon_{j,t}$ is assumed to be i.i.d. Apart from the first order effects discussed in the theoretical section there is only have a clear expectation of the sign of β_p, which is expected to be negative. Increasing inflation has a negative effect on unemployment, decreasing inflation a positive (see for example Layard, Nickell and Jackman (1991)).

The conclusion in Pesaran and Smith (1995) is that in order to estimate long-run relationships, one should probably concentrate on the pooled estimation approach, i.e. averaging for each individual the data over time and then regressing on the resulting cross-section. However, given that the number of individuals is rather small as well ($J = 18$), the estimates are not significant. Therefore, the compromise proposed here is to average the data over periods of five years instead of over the entire available period.

2.4.2 Parameter estimates

The estimation results are shown in Table 2.7[22]. The first column of Table 2.7 presents the estimation results if country or time period fixed effects are not included. Then, one finds that the unemployment rate is positively influenced by taxes, replacement rates and union density. Employment protection and centralization have a negative influence on unemployment. The effects are straightforward. A 10%-point higher tax rate is related to a 1.2%-point higher unemployment rate. A 10%-point higher replacement rate is related to a 0.7%-point higher unemployment rate. Employment protection is a variable that ranges from 0 to 1. Therefore, the estimation results in the first column of Table 2.7 would imply that the difference in unemployment rates caused by employment protection

[22] The estimates are based on 119 observations; absolute t-values (based on heteroskedastic-consistent standard errors) in parentheses. The coefficients over the replacement rate and union density should be divided by 10, the coefficient on centralization should be multiplied by 10.

is at most 3%-points. A 10%-point increase in union density is related to a 0.6%-point increase in the unemployment rate. Finally, since the centralization variable ranges from 1 to 3, the unemployment rate under a system of firm bargaining is 6%-points higher than it is under centralized bargaining[23]. The effect of the change in inflation is significantly negative, according to the expectations.

The parameter estimates in the first column of Table 2.7 are based on a mixture of cross-sectional and time series variation. It is therefore possible to control for unobserved country and time specific effects. The Hausman Test always rejects the null hypothesis of randomness of these specific effects, so there are introduced "fixed" effects. The second column of Table 2. 7 shows the new parameter estimates country fixed effects are included. Then the effect of the replacement rate, employment protection is no longer different from zero at conventional levels of significance. Furthermore, there is an opposite sign for union density. The third column of Table 2.7 shows the parameter estimates with time period fixed effects. Now, taxes and employment protection no longer affect unemployment significantly. The fourth column shows the parameter estimates with both country and calendar time fixed effects. Now, none of the labor market institutions has a significant effect on the unemployment rate. The coefficient of the change in inflation is hardly affected by the introduction of fixed effects. The results with respect to the relationship between labor market institutions and unemployment in the first column seem to be caused by fixed differences between countries and time periods and not by within country changes in labor market institutions. This does not necessarily mean that the parameter estimates in the first column of Table 2.7 are wrong. They could measure the true effects of institutions on the unemployment rate. One cannot identify them because the effects are identified through cross-sectional variation which is removed by introducing country fixed effects. However, one cannot rule out the possibility that the

[23] Calmfors and Driffill (1988) suggest that there is a hump-shape relationship between centralization and unemployment. This hypothesis has been tested here but not supported.

apparent relationship between labor market institutions and the unemployment rate is caused by a third unknown factor, which influences both unemployment and labor market institutions while there is no direct causal relationship from labor market institutions to unemployment.

Column (5) of Table 2.7 shows what happens if one allows for interactions between labor market institutions. In particular, it is investigated whether replacement rate and taxes interact, whether employment protection and centralization interact and whether union density and centralization interact. Significant coefficients are found for all interaction terms but the direct effects for taxes, centralization and employment protection are no longer significantly different from zero. When further investigating the interaction between employment protection and centralization and between union density and centralization it is found that employment protection and union density only affect unemployment when bargaining is at the decentralized level. The theory suggests indeed that the employment effects were likely to be the largest at the decentralized level because wage and employment respond more to each other and to change in institutional parameters. Column (6) of Table 2.7 shows final parameter estimates. It shows a direct positive effect on unemployment or the replacement rate, positive interaction effects between taxes and replacement rates and between union density and centralization. Finally, there is a negative interaction effect between employment protection and centralization.

2.4.3 Calendar time and country fixed effects

The main estimation results presented in Table 2.7 do not reveal the size of the calendar time and the country fixed effects. Yet, from a comparison of the first four columns of Table 2.7 it is clear that they are important. When instead of the country fixed effects average values of the institutional indicators are introduced (Table 2.4) one by one it turn out that the fixed effects are correlated with developments in replacement rates and tax rates. The increase of replacement rates and tax rates over the period of analysis coincide

Direct effects	(1)	(2)	(3)	(4)
Tax (τ)	0.12 (4.1)	0.25 (6.2)	0.04 (1.2)	0.03 (0.4)
Rrate (b)	0.71 (4.1)	0.25 (1.0)	0.53 (3.2)	0.05 (0.2)
EPL (c_f)	-0.34 (3.0)	-0.28 (1.0)	-0.16 (1.3)	-0.10 (0.3)
Udens (β)	0.59 (2.8)	-0.65 (1.8)	0.43 (2.1)	0.11 (0.3)
Cen (η, N)	-0.03 (6.1)	-0.02 (2.2)	-0.02 (4.3)	-0.08 (1.0)
$\Delta^2 p$ (%)	-0.69 (2.7)	-0.63 (3.5)	-0.48 (1.2)	-0.63 (2.5)
$\overline{R}^2$	0.394	0.708	0.468	0.781
Country f.e.	no	yes	no	yes
Time period f.e.	no	no	yes	yes
Direct effects	(5)		(6)	(7)
Tax (τ)	0.09 (1.2)	Tax (τ)	-	-
Rrate (b)	-2.29 (4.4)	Rrate (b)	-2.07 (4.1)	-1.92 (3.9)
EPL (c_f)	-0.77 (1.3)	EPL (c_f)	-	-
Udens	1.61 (2.8)	Udens	-	-
Cen	0.01 (0.1)	Cen	-	-
Home ownership rate (%)	-	Home ownership rate (%)	-	0.14 (3.8)
Interactions				
$\tau * b$	6.40 (5.5)	$\tau * b$	4.79 (4.6)	5.12 (4.5)
$epl * cen$	0.46 (2.7)	$epl \vert cen = 1$	-0.88 (2.7)	-1.20 (4.2)
$ud * cen$	-0.59 (2.3)	$ud \vert cen = 1$	1.16 (2.9)	1.57 (4.2)
$\Delta^2 p$ (%)	-0.48 (2.0)	$\Delta^2 p$ (%)	-0.48 (2.3)	-0.54 (2.2)
$\overline{R}^2$	0.829	$\overline{R}^2$	0.849	0.832
Country f.e.	yes	Country f.e.	yes	yes
Time period f.e.	yes	Time period f.e.	yes	yes

Table 2.7: Estimation results

with the overall increase in unemployment rates.

An additional analysis replaces all the country fixed effects by country averages of institutional indicators. Then, tax rates and centralization have negative effects, while replacement rates, union density and employment protection have a positive effect. Apparently a lot of the fixed differences between countries have to do with differences in replacement rates, union density and centralization where the effects are according to the theoretical predictions. The cross country effect of taxes on unemployment is negative, which is somewhat surprising. However, this could have to do with differences in active labor market policies since countries with high tax rates are likely to spend more money on these types of measures. Employment protection has a positive cross country effect. Since the previous results based on changes in employment protection and changes in unemployment indicate a negative relationship it is obvious that the positive cross country effect has to do with spurious correlation. Apparently there are cross country differences which seem to indicate that countries with a lot of employment protection have high unemployment rates while in fact there is no such positive relationship.

2.4.4 Sensitivity analysis

The home ownership rate has been advocated by Oswald (1996) as an explanation for the rise in unemployment in many European countries. A high home ownership rate may be responsible for a high unemployment because homeowners are relatively immobile.

Column (7) of Table 2.7 reports the results when introducing the home ownership variable as a regressor. Although it was found to have a significant positive effect on the unemployment rate, it does not affect the other coefficients of interest.

2.4.5 Simulations

To illustrate the empirical findings the parameter estimates are used to perform some simulations. Taking the institutional structure of each country in the first half of the

1980s (Table 2.5) as given and then simulating what would have happened if the effects of institutional changes (Table 2.6) were according to the parameter estimates (column (6) of Table 2.7) leads to Table 2.8. The novelty is that the simulations not only show how institutional changes within a particular country affected the unemployment rate but also what would have happened if the institutions would have changed according to the actual changes in a different country.

Take for example France and The Netherlands. According to the parameter estimates and their own institutional changes unemployment in France would have gone up with 2.2% and unemployment in the Netherlands would have gone down with 1.2%. If one imposes the Dutch institutional changes to France unemployment would have gone down with 0.3%. If French institutional changes were imposed to the Dutch labor market unemployment would have gone up with 2.4%. So, the Dutch institutional changes are better for both France and the Netherlands. But, the Dutch changes are more effective in the Dutch situation than they would have been in France. These calculations were done for each pair of countries. Table 2.8[24] shows the simulation results indicating the change in unemployment rate due to the country's own institutional changes and the optimal change if the institutional changes from a different country would have been adopted. For reasons of comparison the first column of Table 2.8 shows the actual changes in unemployment rate from the early 1980s to the early 1990s. The second column shows the simulated change in unemployment over this period. As is clear from a comparison of the columns there is variation in accuracy in the simulations. For some countries like Austria, France, Germany, Japan and the UK the simulations are close to the actual developments. For other countries like Belgium, Denmark, Finland, Ireland, Italy and Sweden there is a substantial difference between simulations and actual developments. Apparently country specific developments not captured by the model are important. The

[24]The simulations are based on the parameter estimates of Table 2-8, including the time fixed effect due to which the unemployment rate in the early 1990s was 1%-point higher than in the early 1980s. Because of missing observations no simulations are presented for New Zealand.

	Actual change	Simulated change		
	80/84-90/94	Own	Optimal	Country
Australia	2.2	0.2	-0.2	Netherlands
Austria	0.5	0.9	-0.2	Netherlands
Belgium	-1.9	2.5	-1.0	Netherlands
Canada	0.4	1.8	-1.5	Netherlands
Denmark	-0.7	2.7	-1.6	Netherlands
Finland	6.8	1.8	0.1	Netherlands
France	2.5	2.2	-0.3	Netherlands
Germany	0.7	1.1	-0.3	Netherlands
Ireland	3.3	1.5	-0.5	Netherlands
Italy	2.4	-0.1	-1.0	UK
Japan	0.0	0.5	-0.7	Netherlands
Netherlands	-3.0	-1.2	-1.2	Netherlands
Norway	3.1	0.9	-0.3	Netherlands
Sweden	3.0	1.0	0.4	UK
Switzerland	1.7	0.7	0.3	Netherlands
United Kingdom	-1.0	0.6	-0.1	Netherlands
United States	-1.8	0.2	-1.0	UK

Table 2.8: Simulations

third column of Table 2.9 shows the unemployment rates if the optimal actual policy mix had been implemented. The differences between the second and the third column indicate that some countries could have performed much better than they actually did. The fourth column shows that this optimal policy mix is from the Netherlands in most cases and from the UK in some cases. The main reason is that the decline in the tax rate and the decline in union membership are important elements of the changes in the Dutch and UK labor market. Labor market changes in the UK and the Netherlands are studied by Nickell and Van Ours (2000a, 2000b). They conclude that much of the recent decline in equilibrium unemployment in both countries is due to a combination of changes in the wage bargaining structures, the tax benefit system and active labor market policies.

2.5 Conclusion

Cross country studies that relate unemployment rates to labor market institutions have limitations in the sense that institutions do not change frequently and cross-sectional variation only is insufficient to catch the true effect of institutions. Also, there are many country specific events that may affect unemployment but which cannot all be taken into account. Part of this criticism also applies to the study presented here. This Chapter studies the effect of institutions on unemployment rates, but it does not take country specific events into account such as the German unification, the large growth of part-time labor in the Netherlands, the big EU subsidies for Ireland or the loss of Eastern Europe exports for Finland. Nevertheless, this study provides valuable insights because it shows that particular combinations of changes in labor market institutions are important in lowering unemployment rates. The findings are that for a lot of countries it is the interaction between tax rates and replacement rates that is driving the evolution of their unemployment rates. If financial incentives have been enforced unemployment was lowered, if financial incentives have been weakened unemployment deteriorated. For other countries changes in the bargaining structure have been more relevant.

The main conclusion is that institutions matter and that institutions interact. In this respect, countries with high unemployment rates could learn from successful countries by imitation. On the basis of simulations that used the parameter estimates from the cross-country analysis, one can conclude that the Netherlands and the UK have had institutional changes that would have been beneficial to other countries too. However, even in a successful country like the Netherlands where unemployment rates went down rapidly over the course of the 1990s it is not clear that the policy instruments that brought the success were based on a clever design (Visser and Hemerijck, 1997). Only with hindsight there was a Dutch "model". So, countries can learn from each other but as Freeman (1998) stresses, countries cannot just borrow some features from successful countries and expect

the unemployment rate to decline since a particular institutional feature may perform differently depending on the overall institutional framework.

2.6 Data appendix

2.6.1 Definition and sources

- **Change in inflation**: Absolute annual change in inflation, the latter defined as the relative increase in consumer prices. Source: Consumer price index, Luxembourg Income Study

- **Tax rate (%)**: Employment tax rate + Direct tax rate

- **Employment tax rate** (%) : Indicator previously computed by the Centre for Economic Performance (London School of Economics), defined as the ratio between the sum of employers' contributions to social security contributions and contributions to private pension schemes (when applicable) and the compensation of employees net of these contributions. Source: CEP (1960-1992), OECD, National Accounts (1993-1996)

- **Direct tax rate** (%) : Indicator previously computed by the Centre for Economic Performance (London School of Economics), defined as the ratio between the sum of households' contributions to social security net the employers' contributions and the income taxes, and the households' current receipts. Source: CEP (1960-1992), OECD, National Accounts (1993-1996)

- **Replacement rate** (%) : Ratio between the unemployment benefit and the median wage. The indicator used for the unemployment benefit is a summary indicator, taking into account various durations and family situations. The ratio has been directly computed by OECD. Only odd years were available. Even years are computed by linear interpolation

- **Employment protection**: Built index indicating the strictness of employment regulation with respect to open-ended contracts, fixed-term (FT) contracts and temporary

work agencies (TWA) (see blow)

- **Centralization index**: Index (1-3) characterizing the degree of centralization of the collective bargaining system, according to the privileged level of bargaining: 1:firm level, 2:industry level, 3:national level. Source: Bratt (1996), OECD, Employment Outlook (1997), Elmeskov et al. (1997). Some countries have changed bargaining regime in the period of analysis. On an annual basis this is a discrete jump between 1, 2 or 3. However, because five-year periods are used the value of the centralization variable may be between two discrete values. If that was the case the value has been rounded to 1,2 or 3.

- **Union density** (%): union density using OECD data, source CEP.

2.6.2 Building the employment protection legislation indicator

Protection of open-ended contracts

Administrative procedure

The marks are added up according to the presence of the mentioned factors.

1 - Notification required (verbally or by letter)

1 - Grounds notification required (verbally or by letter)

1 - Notification to a third party required

2 - Authorization of a third party

Noticing period

0 - No notification period required

1 - $<$ 2 months

2 - $>$ 2 months

Severance payment

0 - No notification period required

1 - $<$ 2 months

2 - $>$ 2 months

Special provisions

1 - Tighter protection of special categories of workers

2 - Companies must provide retraining courses

Definition of unfair dismissals (and provisions with respect to it)

0 - Discrimination and no economic grounds

1 - when social considerations have not been taken into account

1 - when discrimination in the selection procedure of dismissals

1 - when no consultation with the workforce has been undertaken

2 - when re-training the labor force must be attempted

3 - when worker capability cannot be a basis for dismissal

-1 - when a ceiling apply to appeal against unfair dismissal

Collective dismissals (special provisions)

1 - Conciliation with workforce / third party required

1 - redundancies must be accompanied by a social plan

2 - authorization of a third party required

2 - when specific conditions must be fulfilled

Regulation of fixed-term contracts

Purpose

0 - No limit

1 - Specific restrictions (some jobs ore sectors are excluded)

2 - Particular circumstances (increase in the amount of work, temporary replacement of a worker)

2 - Wide restrictions (limited to some jobs or sectors)

3 - Objective reasons (task temporary in nature)

4 - Not allowed

-1 - If can be used for unemployed and apprentices (if restrictions exist otherwise)

Duration

0 - No limit

1 - Limited to 1 year, only few renewals possible

2 - no renewal possible

Temporary work agencies regulation

Purpose

0 - No limit

1 - Specific restrictions (some jobs ore sectors are excluded)

2 - Particular circumstances (increase in the amount of work, temporary replacement of a worker)

2 - Wide restrictions (limited to some jobs or sectors)

3 - Objective reasons (task temporary in nature)

4 - Not allowed

-1 - If can be used for unemployed and apprentices (if restrictions exist otherwise)

Duration

0 - No limit

1 - Limited to 1 year, only few renewals possible

2 - no renewal possible

The evolution of the employment regulation has been graded for all the countries, over the period 1960-1996 . Three indicators have then been computed, averaging the grades related to each component described above. The highest value for each indicator has been normalized to 1, so as to re-scale the indicators in a range [0,1]. The average of the three indicators has then been calculated to obtain the summary index of employment protection

	Mean	Minimum	Maximum	Standard deviation
$\Delta^2 p$	0.02	-3.90	3.60	1.07
Tax rate	0.33	0.06	0.58	0.12
Replacement rate	0.22	0.00	0.63	0.14
Employment protection	0.43	0	1	0.29
Union density	0.45	0.09	0.87	0.16
Centralization	1.94	1	3	0.64

Table 2.9: Basic statistics on the variables

Chapter 3

Political Economy of Employment Protection Legislation

This Chapter is based on the paper "Why is the Employment Protection Stricter in Europe than in the US?" (Belot (2002))[1].

3.1 Introduction

Employment protection is on average stricter in Europe than in the US. Long being blamed for the poor European labor market performance, together with other rigid labor market institutions, employment protection has recently, to some extent, been freed of charges. The role of the employment protection on the unemployment rate would be minor. However, employment protection has a significant negative effect on the labor market inflows and, in particular, unemployment in- and outflows (Nickell and Layard

[1] While remaining responsible for any errors, the author thanks Jan van Ours, Dale Mortensen, Michael Wallerstein, Gady Barlevy, Michael Krause, Jan Boone, Jeroen van de Ven, Siwan Anderson, seminar participants at Northwestern University (2001) and in Tilburg (2002), conference participants of the ENTER Jamboree in Toulouse (2000) and the IZA workshop on Job Stability and Security in European Labor Markets (2002), and participants to the IZA Summer School in Labor Economics (2002) for their useful comments. The author also gratefully acknowledges financial support from the Dutch National Scientific Research Institute (NWO) and thanks the Department of Economics at Northwestern University for its hospitality and support.

(1999) and OECD (1999)).

Most of the European countries have been reforming their employment protection legislation (EPL) over the last decade, towards more flexibility essentially. Reforming these institutions might however be limited by the lack of political support. Saint-Paul (2000) has provided a major contribution with respect to the political economy of labor market institutions. He argues that these institutions benefit to a well-organized part of the population so that the implementation of a reform would be difficult. Rigid labor market institutions in Europe have given birth to large rents on the worker's side, and the median voter is supposed to belong to that category.

While the consequences of the differences in institutions between the US and Europe are relatively well identified, their origins are more obscure. These countries are democracies and these institutions can be considered as the outcome of a democratic political process. The question is then: Why do Europeans need employment protection while Americans do not? Answering this question will help to identify more clearly the role of employment protection and hopefully contribute to the large current debate on the reform of the EPL.

This Chapter relates the differences in observed EPL to exogenous and fundamental differences in two dimensions: the economic heterogeneity and the migration costs. When a country is composed of economically heterogenous regions, it is very likely that once a region is hit by a negative shock, other regions in the same country are doing better. Hence, employment protection and migration between economically different regions can be seen as two alternative instruments at the disposal of the workers to protect their income[2]. The argument is that migration is more attractive in America because exogenous migration costs are lower and migration gains are larger than in Europe. Americans prefer

[2]The term "insurance" is not used here as the aim of this paper is to show that migration and employment protection are competing instruments affecting the "average" income of the workers. We do not concentrate here on the protection against income *fluctuations.* Workers will therefore are assumed to be risk neutral.

not having their jobs protected so that the job finding and firing rates are high and they can move fast to better horizons so as to maintain a high average income. In Europe migration is costly and countries are small so that migration between regions makes less sense. Employment protection legislation is a way for the median voter (most likely an employed worker) to protect his income and job in case of negative shocks, since without it, their chance of becoming and staying unemployed in their region (they do not find it profitable to migrate) is higher.

One needs to realize that workers need to *choose* between the two instruments, i.e. they cannot have the best of both worlds. Indeed, as soon as employment protection exists, the efficiency of migration as an income protection device is reduced, as EPL reduces the job finding and firing rates, i.e. the speed of reallocation from low productive places to better ones. Hence, the relationship between employment turnover and employment protection should go in both directions and should be negative, as observed in the empirical facts. Hassler and Rodriguez-Mora (1999) also suggest this type of relationship but then between employment turnover and unemployment insurance. Their argument however is different from the one presented here. In particular, employment turnover determines how saving and borrowing are good substitutes for the unemployment insurance. Hence they show that a low turnover increase the persistence of income shocks and makes unemployment insurance relatively more attractive.

The Chapter is organized as follows. Section 3.2 presents some stylized facts and a brief review of the literature on employment protection and migration. Section 3.3 introduces the model and discusses the equilibria. Section 3.4 illustrates the mechanisms of the model with a numerical example. Section 3.5.1 discusses the results and assumptions. Finally, section 3.6 concludes.

3.2 Employment protection and migration - Evidence and theory

Section 1.2.2 (Table 1.11) describes the evolution over time and the differences in EPL across OECD countries. The relevant aspect for this study is that the United States have a much more flexible regulation than most European countries.

There is a huge literature on the effects of employment protection on labor market performance. There seems however to be a consensus on the following: Employment protection does not have much effect on the level of unemployment but does have an effect on the labor market flows and, in particular, on the unemployment in- and outflows (Nickell and Layard (1999), OECD (1999)). In other words, the empirical evidence suggests that it is easier for an unemployed person to find a job in a flexible country than in a rigid one (see for example Schettkat (1997)). This point is crucial for the argument of this Chapter. A population which does not support employment protection chooses high job finding and firing rates, which guarantee that workers can move quickly from low productive places to high productive ones. Employment protection reduces the gains from migration of unemployed looking for better jobs in other regions of the country.

This raises the question of why such rigidities exist in the first place. These countries are democracies and this type of institution is the outcome of a political process. Saint-Paul (1997) suggests that the reason why EPL is stricter in Europe than in the US relies on other existing rigidities, such as powerful union organizations. This Chapter proposes an alternative (but not rival) explanation relying on the difference in the gains and costs from migration. The United States are usually thought of as the country where people move fast and to a large extent. Europe on the other hand shows a lower degree of labor mobility, even within countries (see Thomas (1994), Decressin and Fatas (1995)).

Given that the objective of this Chapter is to understand the mechanisms leading to the political support of employment protection legislation and that this type of policy is set

at the country level, one should compare essential characteristics of individual European countries and the United States. Indeed, this Chapter suggests that when determining their political preferences with respect to employment protection, workers make a trade off between the gains and costs from migration and the gains and costs from employment protection. Since employment protection is chosen at the country level, workers need to consider migration opportunities corresponding to this particular political entity. They cannot take the general equilibrium effect of employment protection on job finding and firing rates into account with respect to other migration opportunities (between countries). However, given the progress of the European unification process, it is interesting to make predictions about what would happen to the political support of EPL if it would be set at the European level. The relevant migration opportunities to consider then would be the ones between all regions of Europe.

There is a lack of reliable statistical material on migration between regions of nation states of Europe. Puhani (2001) summarizes studies on labor mobility in OECD countries. These studies consider both migration between countries and within countries. What is usually observed is that migration as a share of the total population is lower in Europe than in the United States. The OECD (1986) shows that interregional migration is the highest in the USA, Australia and Canada and the lowest in Europe. A study by De Grauwe and Vanhaverbeke (1993) shows that interregional mobility also differs across European states. Hence, interregional mobility in the Southern countries (Spain, Italy) is less than half as large as in the Northern and continental ones (Denmark, Finland, France, the Netherlands and UK). These observations are very interesting for the purpose of this study since this ordering corresponds precisely to the one presented above, reporting the degrees of strictness of employment protection legislation. Hence, the empirical facts show that lower mobile countries have a stricter employment protection. However this is only an observed correlation, that does not tell nothing about the direction of the causality. It could be that strong employment protection actually reduces labor mobility rather than

the other way around.

Stark (1991) introduces migration as a risk-diversification device in the context of rural-urban migration in developing countries. Migration can work as a risk diversification device in the presence of economic heterogeneity. One should investigate two elements. First, labor mobility could be lower in Europe because there are less asymmetries, a larger economic homogeneity. Second, labor mobility could be lower in Europe because there are large migration costs. In that case, the responses to these asymmetries would be lower in Europe than in the US.

Regarding the first point, it is certainly true if one compares the United States with each European country in particular. The size of the United States is indeed such that the economic heterogeneity is larger than in any particular European country. This means that all else equal, Americans have more opportunities in their country to maintain their income than Europeans do. Looking on the other hand at the economic heterogeneity of Euro-Land as a whole, the empirical evidence suggests the opposite. Hence, Bentivogli and Pagano (1999) note that asymmetric shocks are more likely to occur in Europe than in the US. This means that one should observe relatively more migration *between* European countries than *within* them, which is not supported by the empirical facts.

Concerning the second point, the facts show that the reason why people do not move in Europe is not due to the absence of migration opportunities. In other words, there are differentials in economic variables that could theoretically determine migration (such as unemployment differentials, wage differentials) but that do not stimulate labor mobility in practice. Studies by Barro and Sala-i-Martin (1995) and Gros (1996) show that European migratory responses to unemployment and wage differentials between and within nation states are indeed lower in Europe than in the United States. Barro and Sala-i-Martin (1995) estimate the elasticities of net migration into a region with respect to economic variables such as the per capita income in that region. They find a significant positive coefficient for the United States: A 10 percent differential in income per capita raises

net-in-migration to bring the region's population growth rate up by 0.26 percent per year. This is apparently not such a strong effect but it is still stronger than the ones estimated for the European countries (where most of them are even insignificant). De Grauwe and Vanhaverbeke (1993) show that interregional migration is relatively low in Southern European countries, despite the existence of higher income differentials in the South. In the same line of studies, Bentivogli and Pagano (1999) find that the response of wage and unemployment differentials is much stronger in the US than in the European regions taking part to the launching of the Euro-zone. They find that unemployment differentials stimulate population flows 10 times as much in the US than in Euro-Land and that wage differentials give rise to flows that are double the size in the US than in Euro-Land. This means that even in the presence of migration opportunities, Europeans do not migrate much.

The question is then: why do people not migrate to better horizons? The obvious answer is that there are large social and cultural barriers. But this is not a very strong argument to explain low mobility within countries. Oswald (1996) and Gros (1996) mention the role played by the regulation of the housing market. Gros observes in Europe a strong correlation between the rate of inter-regional migration and the proportion of houses occupied by their owners in 1991 and 1992. Oswald shows that differences in the home ownerships across OECD countries can explain part of the differences in observed unemployment rates. Another reason could be that European rigid labor market institutions make its workers relatively more attached to their roots. A recent paper by Hassler et al. (2001) argues that there is a circular relationship between the unemployment insurance system and the geographic attachment of the labor force (and so the low mobility). The more generous the unemployment system the more likely you are attached to your region and the more attached you are the stronger you support unemployment insurance. They find under certain conditions that two self-reinforcing equilibria can exist: one with high insurance, low mobility and high unemployment (typically the European case) and

the other one with low insurance, high mobility and low unemployment (typically the American case). The reason why relatively unattached populations prefer a lower level of insurance lies in the existence of a fiscal distortion (unemployment benefits are financed by taxes raised on labor). In the same line of reasoning, it is argued here that these institutions, and in particular employment protection, have been chosen *because of* the existence of moving costs related to more essential barriers such as the regulation of the housing market, the cultural and social barriers, etc. Once in place these institutions reduce even further the incentives to migrate but this Chapter argues that they first should be thought as the consequence of a malfunctioning income protection device (migration).

3.3 The model

The objective of this Chapter is to show that migration costs and gains determine the preferences of the population with respect to employment protection. Employment protection plays two important roles for the workers. First, it protects their job and gives them some insider power (enables them to bargain higher wages). Second, it reduces both job creation and job destruction. This has two implications. It means first that it is more difficult for an unemployed worker to find a job and, second, that some low productive jobs are maintained although they would disappear if there was no employment protection.

Suppose the workers can choose between a fixed firing cost and no firing cost. One crucial aspect determining his choice is the exogenous migration gains and costs he has to incur when he wants to move to better horizons. Hence, if these gains are high (because for example of a large economic heterogeneity) and these costs are low (because for example of a large cultural homogeneity), the median voter may be willing to trade the insider gains from employment protection for a better outside option. Indeed, without employment protection, job creation is high and it is relatively easy for an unemployed worker to find a job. If migration is not very attractive (high costs and/or low gains) on the other

hand, this worker prefers his job to be safe even if this means it to be maintained at low productivity levels. The model will now be described in detail.

3.3.1 Basic framework

To formalize the argument, several elements are needed. First, one needs a framework formalizing the determinants of migration, which are the economic heterogeneity within the country and the exogenous migration costs incurred when migrating across these economically different regions.

The simplest way to model the economic heterogeneity is to introduce a country with two regions which differ by a region-specific productivity differential denoted here by ε. In other words, the regions can be in two possible states of the world, a good state (g) or a bad state (b). The states of the world are not necessarily permanent. Hence, a parameter λ is introduced and denotes the probability that the regions switch states of the world (the good region falls then into a slump and the bad region enters a boom)[3]. The evolution of the regional productivity element can therefore be represented by a symmetric two-state Markov chain, with λ being the transition probability from a bad (good) state to a good (bad) state. The stochastic transition matrix associated with it is:

$$\begin{pmatrix} (1-\lambda) & \lambda \\ \lambda & (1-\lambda) \end{pmatrix},$$

If λ is close to 0, one can say that the differentials are persistent.

Next a parameter c_m is introduced, that measures the cost of migrating between these two regions. This cost is assumed to be exogenous and constant. In particular, it does not depend on the number of migrants or on a fixed factor such as land. This is not crucial for the essence of the results.

[3]This assumption of perfect negative correlation simplifies the model a lot but is not necessary for the results. What is needed is a country where at one moment in time, there is another region in the same country that is doing better of worse than yours. The most simple way to model this is to assume that there are only two regions which are perfectly negatively correlated with respect to their state of nature.

Hence, ε and c_m are the essential parameters that will be played with to explain differences in political preferences for employment protection between the US and European countries[4].

Second, one needs a parameter featuring the employment protection legislation and one needs endogenous job creation and job destruction that are directly affected by this EPL. Furthermore, workers (or matches) should be different (so that employment protection modifies the proportion of low productive workers fired when a negative aggregate shock occurs). Hence, firms and workers are assumed to form matches with a match-specific productivity x, that corresponds to a random draw from a uniform distribution $f(x)$ defined on the interval $[0, 1]$. The match-specific productivity is revealed as soon as a match takes place. $\underline{x}_b$ and $\underline{x}_g$ denote the productivity floors above which the worker and the firm find it profitable to establish an employment relationship. The match-specific productivity element of a match remains constant over time, so that one can identify at the beginning of the relationship which matches will be dissolved by a negative regional shock. Then low productive matches are destroyed and workers become unemployed. $\widetilde{x}$ denotes the productivity threshold under which matches are destroyed once hit by an aggregate negative shock. Hence, in a boom, two types of jobs can be defined: *surviving* jobs (that will survive even if the region is hit by a negative productivity shock) that are such that $\widetilde{x} \leq x \leq 1$ and *dying* jobs (that will not survive to the slump) that are such that $\underline{x}_g \leq x < \widetilde{x}$. In a slump, there are on the other hand only surviving jobs since the regional aggregate shock would only improve the productivity of the matches ($\underline{x}_b \leq x \leq 1$). The parameter c_f is introduced as the firing cost incurred by firms at separation. This firing cost will change the chance of being hired and fired.

[4]One could argue that ε should be endogenous, as migration probably reduces the economic differentials between regions. This is true and would imply in this model that migration would become less profitable at some point. But what is relevant to explain the political preferences here are the migration opportunities existing before migration takes place. The model implies that the attractiveness of migration does not change with migration, but this is not crucial for the results.

Third, one needs matches that can also be destroyed for other reasons than aggregate regional shocks[5]. Hence, it is assumed that jobs are destroyed for exogenous reasons with probability δ. This translates the idea that some turnover is efficient.

Fourth, an adequate model of labor reallocation should take search frictions into account. Therefore, the labor market is modelled within a matching framework, that assumes that finding a new partner costs time and resources. In particular, a worker and a firm meet at a rate determined by a *matching function* $m(u, v)$, that exerts constant returns to scale. θ is defined as $\frac{v}{u}$, the labor market tightness, i.e. the number of vacancies (v) available per unemployed worker (u being the total number of unemployed workers). The probability that an unemployed worker matches with a vacancy is then equal to $m(\theta) = \frac{m(u,v)}{u}$ and the probability that a vacancy matches with an unemployed worker is equal to $q(\theta) = \frac{m(u,v)}{v} = \frac{m(\theta)}{\theta}$. Only unemployed workers migrate[6]. Unemployed workers can either search for a job in their own region or in the neighboring one. If they decide to look for a job in the neighboring region, they incur the migration cost c_m.

The sequence of events goes as follows. First, unemployed workers choose the region in which they prefer searching for a job. Firms post vacancies. Matches take place and their corresponding productivity is revealed. Matches with too low productivities do not lead to an employment contract and separation occurs immediately and at no cost. With probability λ, the state of the world changes and the lowest productive employed workers are fired (when the state of the world changes from good to bad). With probability δ matches are dissolved for exogenous reasons. Firms incur a firing cost c_f. Wages are bargained at the beginning of the contract and as soon as there is a productivity change[7].

[5] If this would not be the case, all workers would in the long run end up in high productive jobs that can never be destroyed. The unemployment rate would in the long run tend to 0, which is not realistic.

[6] This is a simplifying assumption that imposes a transition via unemployment in order to find a job in another region, which does not seem unrealistic. This implies that in equilibrium only unemployed workers will find it profitable to do so.

[7] This assumption is not crucial. One could for example assume that wages are some average of the wages in a good and in a bad state. But given that workers are risk neutral, wage fluctuations do not matter at all, only the average income does.

The next section presents the Bellman equations used in the model and then, given that agents are perfectly foresighted, the model is solved by backward induction.

3.3.2 Bellman equations

Values of searching for a job

The asset values of searching for a job in the state of the world s, U_s is defined as follows:

$$rU_s = b + m(\theta_s)\left(E(W_s(x) - U_s)\right) + \lambda(\overline{U}_t - U_s), \tag{3.1}$$

with $s \neq t$,

where b is the unemployment benefit, $E(W_s(x))$ is the expected value of working in a region s, $s = g, b$. While being unemployed in the region in state of the world s, a worker benefits from an unemployment income (that might as well be the value of leisure or other non-market activities); he finds a job with probability $m(\theta_s)$, for which the corresponding expected gain is equal to $E(W_s(x) - U_s)$. Furthermore, he faces the risk λ of his region switching to the other state of the world. In the latter case, he might either stay in his region or migrate to the other region and incur the migration cost c_m. Migration takes place only if it is profitable to do so. Consequently, the option value of becoming unemployed in a region that is in the state of the world t is $\overline{U}_t = \max\{U_t, U_s - c_m\}$. What are the main differences between the values of being unemployed in a bad and in a good region? First, the respective probabilities of finding a job may differ. It is easier to find a job in a tighter labor market. The tightness of the labor market is here determined by the job creation condition that is described below. Second, once he finds a job, the expected value of this job may differ according to the state of the world. The intuition suggests that the expected value of working in a good region is higher than in a bad region. This will indeed be the case.

Values of working

The value of working in a surviving job $W_g^s(x)$ in a good region is defined as a function of the match-specific productivity x:

$$rW_g^s(x) = w_g^s(x) - \lambda(W_g^s(x) - W_b(x)) - \delta\left(W_g^s(x) - \overline{U}_g\right), \tag{3.2}$$

where $w_g^s(x)$ is the corresponding wage, $W_b(x)$ is the value of working in a (surviving) job in a bad region.

The value of working in a *dying* job $W_g^d(x)$ in a good region is:

$$rW_g^d(x) = w_g^d(x) - \lambda(W_g^d(x) - \overline{U}_b) - \delta(W_g^d(x) - \overline{U}_g), \tag{3.3}$$

where $w_g^d(x)$ is the corresponding wage. A worker in a dying job loses by definition his job when the regional shock arises. Being unemployed, he has the choice to stay unemployed in the stagnating region or move to the booming neighboring region (and then incur the migration cost).

Finally, the value of working in a bad region is:

$$rW_b(x) = w_b(x) - \lambda(W_b(x) - W_g^s(x)) - \delta\left(W_b(x) - \overline{U}_b\right), \tag{3.4}$$

where $w_b(x)$ is the corresponding wage.

Vacancy posting

Firms post vacancies on the labor market. The value of posting a vacancy V_s in a region s, $s = g, b$, is defined as follows:

$$rV_s = -c_r + q(\theta_s)(E(J_s(x) - V_s)) + \lambda(V_t - V_s), \tag{3.5}$$

with $s \neq t$,

where c_r is the recruitment cost (or flow cost of posting a vacancy), $q(\theta_s)$ is the probability of matching with an unemployed worker, $E(J_s - V_s)$ is the expected surplus when filling a vacancy in region s.

Assuming that there is free entry on the vacancy market, firms post vacancies until the value of doing so is equal to 0:

$$rV_g = rV_b = 0. \tag{3.6}$$

This implies that vacancy posting is such that the expected cost of posting a vacancy is equal to its expected gain:

$$\frac{c_r}{q(\theta_s^*)} = E(J_s(x)), \tag{3.7}$$

Condition [3.7] is usually referred to as the *job creation condition.* It implies here that the market tightness is the highest, in equilibrium, in the region that has the highest expected value of filling a vacancy (this means even after migration). It is also worth noting that the job creation condition remains satisfied after migration, meaning that the market tightness does not change with migration flows.

Values of filling a vacancy

The respective values $J_g^s(x), J_g^d(x)$ and $J_b(x)$ of filling a vacancy with a match with idiosyncratic productivity x are defined as follows:

$$rJ_g^s(x) = x + \varepsilon - w_g^s(x) - \lambda(J_g^s(x) - J_b(x)) - \delta\left(J_g^s(x) - V_g - (-c_f)\right), \tag{3.8}$$

$$rJ_g^d(x) = x + \varepsilon - w_g^d(x) - \lambda(J_g^d(x) - V_b - (-c_f)) - \delta\left(J_g^d(x) - V_g - (-c_f)\right), \tag{3.9}$$

$$rJ_b(x) = x - w_b(x) - \lambda(J_b(x) - J_g^s(x)) - \delta\left(J_b(x) - V_b - (-c_f)\right), \tag{3.10}$$

where V_b is the value of posting a vacancy in a bad region.

The basic difference between the valuations of the jobs is that when filling a vacancy with a dying job, the firm knows that it will have to fire the worker with probability $\lambda + \delta$, while the probability of having to fire a worker in a surviving job is δ. The job then becomes vacant and the firm has to pay the firing cost c_f.

Let us now turn to the formal description of the model.

3.3.3 Wage bargaining

Workers and firms bargain over wages through a Nash bargaining process so that the wage maximizes a weighted average of the respective surplus of the bargaining partners:

$$w_g^s(x) = \arg\max_{w_g^s(x)} \left(W_g^s(x) - \overline{U}_g\right)^{\beta} \left(J_g^s(x) - V_g - (-c_f)\right)^{1-\beta}, \tag{3.11}$$

$$w_g^d(x) = \arg\max_{w_g^d(x)} (W_g^d(x) - \overline{U}_g)^{\beta} (J_g^d(x) - V_g - (-c_f))^{1-\beta}, \tag{3.12}$$

$$w_b(x) = \arg\max_{w_b(x)} \left(W_b(x) - \overline{U}_b\right)^{\beta} \left(J_b(x) - V_b - (-c_f)\right)^{1-\beta}, \tag{3.13}$$

where β is the worker's relative bargaining power and $\overline{U}_s = \max[U_s^*, U_t^* - c_m]$, with $s \neq t$, defines the outside option of a worker: it is either being unemployed in the region where he is now or being unemployed in the other region but then incurring the migration cost in order to move there.

The equilibrium bargained wages can then be derived:

$$w_g^s(x)^* = w_g^d(x)^* = (1-\beta)(r\overline{U}_g^* + \lambda(\overline{U}_g^* - \overline{U}_b^*)) + \beta\left(x + \varepsilon + rc_f\right), \tag{3.14}$$

$$w_b(x)^* = (1-\beta)(r\overline{U}_b^* - \lambda(\overline{U}_g^* - \overline{U}_b^*)) + \beta\left(x + rc_f\right), \tag{3.15}$$

At a given match-specific productivity level x, the equilibrium wage is the same in a dying and in a surviving job. In both bad and good regions, the wage increases with the outside option $\overline{U}_s$, with the total productivity of the match and with two types of insider power coming from the firing cost and the difference between the two outside options. The first type is usually referred to as the *worker insider power,* i.e. the power of being already inside the firm. The second type is what is called here the *region insider power,* i.e. the power or weakness of being in the region. Suppose that workers in the good region are better off than workers in the bad region. If there is no migration cost, one should expect that the outside options in both regions should converge to each other. If there is a migration cost however, workers in a good region are better off because they do not suffer so much from the competition of migrant workers. Workers in a bad region, on the

other hand, are "trapped" in their region. Therefore, this regional insider power pushes the wages up in a good region and down in the bad region (it is then more a weakness than a power).

3.3.4 Thresholds

This section determines two types of match-specific productivity thresholds. First, the thresholds at which the firm is indifferent between offering a contract or not ($\underline{x}_b$ and $\underline{x}_g$) and second, the threshold at which the firm is indifferent between a surviving job and a dying job.

In order to determine these thresholds, it is necessary to calculate the equilibrium values of filling a vacancy, as a function of the match-specific productivity x:

$$J_g^s(x) = (1-\beta)\left[\frac{x}{r+\delta} + \frac{\varepsilon(r+\delta+\lambda)}{(r+\delta)(r+\delta+2\lambda)} - r\overline{U}_g - \frac{\delta\lambda}{r+\delta+2\lambda}(\overline{U}_g - \overline{U}_b)\right] - \frac{r\beta+\delta}{r+\delta}c_f, \tag{3.16}$$

$$J_g^d(x) = (1-\beta)\left[\frac{x+\varepsilon - r\overline{U}_g - \lambda(\overline{U}_g - \overline{U}_b)}{r+\delta+\lambda}\right] - \frac{r\beta+\delta+\lambda}{r+\delta+\lambda}c_f, \tag{3.17}$$

$$J_b(x) = (1-\beta)\left[\frac{x}{r+\delta} + \frac{\varepsilon\lambda}{(r+\delta)(r+\delta+2\lambda)} - r\overline{U}_b + \frac{\delta\lambda}{r+\delta+2\lambda}(\overline{U}_g - \overline{U}_b)\right] - \frac{r\beta+\delta}{r+\delta}c_f, \tag{3.18}$$

The value of filling a vacancy increases in all jobs with the match-specific productivity, the regional productivity increment and decreases with the outside option, the regional insider power and the firing cost.

Lemma 3.1 *The value of filling a vacancy with a dying job has a steeper slope than the value of filling a vacancy with a surviving job.*

Proof. $\frac{\partial J_g^s(x)^*}{\partial x} = \frac{1-\beta}{r+\delta} \leq \frac{1-\beta}{r+\delta+\lambda} = \frac{\partial J_g^d(x)^*}{\partial x}$, since $\lambda > 0$. ■

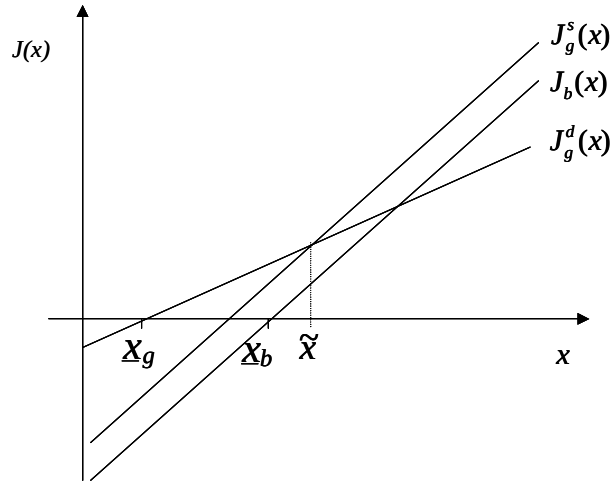

Figure 3.1: Values of filling a vacancy as a function of the match-specfic productivity x.

This implies that dying jobs could exist in the circumstances represented in Figure 3.1. The intuition for the existence of dying jobs is the following. The higher productivity differential between good and bad states and the lower the firing cost the more likely it is worth it to have jobs existing only in good times and destroyed as soon as bad times occur. High productive jobs are worth maintaining independently of the state of the world if the match specific productivity x is sufficiently high to make these matches profitable, even in bad times.

Let us now turn to the determination of the productivity thresholds.

The lowest productivity level acceptable for the firm to employ the worker in a booming region, denoted $\underline{x}_g$, is such that:

$$\underline{x}_g = Min\{\underline{x}_g^d, \underline{x}_g^s\}, \tag{3.19}$$

where $\underline{x}_g^d$ is such that $J_g^d(\underline{x}_g^d) = 0$, $\underline{x}_g^s$ is such that $J_g^s(\underline{x}_g^s) = 0$. In words, the minimum level of productivity required to start an employment relationship in a booming region is the productivity level such that the corresponding value of matching for the firm is equal to 0. When $\underline{x}_g^d < \underline{x}_g^s$, dying jobs exist and the lowest productive job is dying. When $\underline{x}_g^d \geq \underline{x}_g^s$, dying jobs do not exist and the lowest productive job is surviving.

$\underline{x}_g^s$ is such that:

$$\underline{x}_g^s = -\frac{\varepsilon(r+\delta+\lambda)}{r+\delta+2\lambda} + r\overline{U}_g + \frac{\delta\lambda(r+\delta)}{r+\delta+2\lambda}(\overline{U}_g - \overline{U}_b) + \frac{r\beta+\delta}{1-\beta}c_f, \tag{3.20}$$

$\underline{x}_g^d$ is such that:

$$\underline{x}_g^d = -\varepsilon + r\overline{U}_g + \lambda(\overline{U}_g - \overline{U}_b) + \frac{r\beta+\delta+\lambda}{1-\beta}c_f, \tag{3.21}$$

The lowest match-specific productivity level acceptable for a firm to start an employment relationship in a stagnating region, denoted $\underline{x}_b$, is such that $J_b(\underline{x}_b) = 0$:

$$\underline{x}_b = -\frac{\varepsilon\lambda}{(r+\delta+2\lambda)} + r\overline{U}_b - \frac{\delta\lambda(r+\delta)}{r+\delta+2\lambda}(\overline{U}_g - \overline{U}_b) + \frac{r\beta+\delta}{1-\beta}c_f, \tag{3.22}$$

Expressions [3.20], [3.21] and [3.22] establish a positive relationship between the outside option in one region (U_s) and the minimum productivity required at entry. This is the second step in job creation (after vacancy posting, that is analyzed in the next section). The higher the outside option, the higher the productivity required at entry. A high productivity differential stimulates job creation, while the regional insider power reduces it.

The threshold between a dying and surviving job $\widetilde{x}$ is defined as follows:

$$\widetilde{x} = \min\{\underline{x}_g^s, \widetilde{x}_{d,s}\}, \tag{3.23}$$

where $\widetilde{x}_{d,s}$ is such that:

$$J_b^s(\widetilde{x}_{d,s}) = -c_f, \tag{3.24}$$

or equivalently:

$$J_g^d(\widetilde{x}_{d,s}) = J_g^s(\widetilde{x}_{d,s}), \tag{3.25}$$

which leads to the following expression for $\widetilde{x}_{d,s}$:

$$\widetilde{x}_{d,s} = -\frac{\varepsilon\lambda}{(r+\delta+2\lambda)} + (r+\delta)r\overline{U}_b - \frac{\delta\lambda(r+\delta)}{r+\delta+2\lambda}(\overline{U}_g - \overline{U}_b) - rc_f \tag{3.26}$$

Equation [3.26] determines the productivity limit for job destruction. Under this productivity limit, jobs are destroyed once the region falls into slump: these jobs are dying jobs. Hence equation [3.26] can be interpreted as the *job destruction* condition.

Note that the share of dying jobs ($F(\widetilde{x})-F(\underline{x}_g)$) depends on the economic heterogeneity (+) and the migration costs (-). The intuition is that a high economic heterogeneity has a larger positive effect on the value of a dying job than on the value of a surviving job (as the latter alternates between good and bad states). Also the migration cost increases the hiring productivity floor and decreases the firing productivity threshold. This is because a migration cost hits more dying jobs than surviving jobs (for which the wages alternate regional insider gains and losses, while there are only regional insider gains in dying jobs). Furthermore, it has been shown that the value of filling a vacancy with a *dying* job is more sensitive to changes in the employment protection than the value of filling a vacancy with a *surviving* job. It will appear that this effect determines the preferences with respect to employment protection.

3.3.5 Vacancy posting

Let us now come back on the vacancy posting decision. Since there is free entry on the vacancy market, vacancies are posted in region s until $V_s = 0$. Let us recall the job creation condition:

$$\frac{c_r}{q(\theta_s)} = E(J_s(x)), \tag{3.27}$$

where

$$E(J_g(x)) = \int_{\underline{x}_g}^{\widetilde{x}} J_g^d(x)f(x)dx + \int_{\widetilde{x}}^{1} J_g^s(x)f(x)dx, \tag{3.28}$$

$$E(J_b(x)) = \int_{\underline{x}_b}^{1} J_b(x)f(x)dx, \tag{3.29}$$

Equation [3.27] establishes a negative relationship between the outside option U_s and the market tightness θ_s. The outside option pushes the wages up and the values of filling

a vacancy down, and so reduce the profitability of posting a vacancy. This equilibrium condition is the first step in job creation. Hence, the outside option reduces job creation through two channels: first, by reducing the profitability of vacancy posting and, second, by increasing the productivity required at entry.

Proposition 3.1 *The market is tighter in the good region* : $\theta_g^* \geq \theta_b^*$

Proof. Given that for all $\overline{x} \in [0,1] : J_g^s(\overline{x}) = J_b^s(\overline{x}+\varepsilon)$, and that $\frac{\partial J_g^s(y)}{\partial y} > 0$, we have $\int_{\widetilde{x}}^1 J_g^s(x)dF(x) \geq \int_{\widetilde{x}}^1 J_b(x)dF(x)$. This is sufficient to prove that $\theta_g^* \geq \theta_b^*$ in the case where no dying jobs exist. If dying jobs exist, we have:

For all $x < \widetilde{x}$, it holds that $J_b(x) < -c_f$ and for all $\underline{x}_g < x < \widetilde{x}$ it holds by definition that: $J_g^d(x) \geq 0$, and therefore that $\int_{\underline{x}_g}^{\widetilde{x}} J_g^d(x)dF(x) \geq 0$. Therefore we have $\int_{\underline{x}_g}^{\widetilde{x}} J_g^d(x)dF(x) + \int_{\widetilde{x}}^1 J_g^s(x)dF(x) \geq \int_{\underline{x}_b}^1 J_b(x)dF(x)$, which implies that $\theta_g^* \geq \theta_b^*$. ■

Proposition 3.2 *Given* $\overline{U}_b$ *and* $\overline{U}_g$*, an increase in the employment protection has a negative effect on vacancy posting.*

Proof. Using Leibniz rule:

In a good region (with dying jobs):

$\frac{c_r}{q(\theta_g)^2}\frac{\partial q(\theta_g)}{\partial \theta_g}\frac{\partial \theta_g}{\partial c_f} = \left[-\frac{r\beta+\delta+\lambda}{r+\delta+\lambda}(F(\widetilde{x}) - F(\underline{x}_g^d)) - \frac{r\beta+\delta}{r+\delta}(1-F(\widetilde{x}))\right] < 0;$

In a bad region:

$\frac{c_r}{q(\theta_b)^2}\frac{\partial q(\theta_b)}{\partial \theta_b}\frac{\partial \theta_b}{\partial c_f} = [-(1-F(\underline{x}_b)\beta] < 0.$ ■

Interesting for the purpose of this study, the negative effect on vacancy posting is larger the larger the share of dying jobs.

3.3.6 Migration decision

Let us now turn to the migration decision. All workers can migrate but in equilibrium only unemployed workers find it profitable to do so. The reason is that an unemployment spell is imposed to migrating workers. Given that the outside option (being unemployed)

is taken into account while bargaining over wages, employed workers will never find it profitable to migrate.

Before migration takes place, the labor market in a region s is composed of v_s vacancies and $u_{s,s}$ resident unemployed. $[U_g^*]^z$ and $[U_b^*]^z$ are defined as the equilibrium values of being unemployed if no migration would take place (the superscript z stands for "zero migration"). The respective market tightness are then $[\theta_g^*]^z = \frac{v_g^*}{u_{g,g}^*}$ and $[\theta_b^*]^z = \frac{v_b}{u_{b,b}}$.

Let us now consider the migration decision. An unemployed worker in a region s, with $s = b, g$, migrates to the neighboring region when the value of being unemployed there $[U_t^*]^z$, with $t \neq s$ minus the migration cost c_m is larger or equal to the value of being unemployed in his own region:

$$[U_t^*]^z - c_m \geq [U_s^*]^z, \tag{3.30}$$

Condition [3.30] is identical for all unemployed workers, since they are homogenous.

Let us summarize the *migration condition*:

$$\begin{aligned} if\ [U_s^*]^z - c_m &\geq [U_t^*]^z \Leftrightarrow u_{s,t} \geq 0 \text{ such that } [U_t^*]^m = [U_s^*]^m + c_m, \\ else\ u_{s,t} &= 0, \end{aligned} \tag{3.31}$$

where $[U_t^*]^m$ is the equilibrium value of being unemployed in a region t (after migration).

Proposition 3.3 *There are two possible migration equilibria (depending on the configuration of parameters): a zero-migration (ZM) equilibrium where no one migrates and a full-migration (FM) equilibrium where all the unemployed workers migrate from one region to the other.*

The reasoning is the following: If it is too costly for one unemployed worker to migrate, it is too costly for all of them since they are homogenous. Hence, there is a ZM equilibrium. When, on the other hand, migration is profitable for one worker, it will be profitable for

all of them to migrate. The reason lies in the vacancy posting decision. Indeed, a tighter labor market means that it is more attractive for the unemployed workers to migrate over there. But each migrant stimulates again vacancy posting in the region where he is migrating by reducing the market tightness. And, similarly, each migrant leaving his region discourages vacancy posting in his originating region by making the market less tight there. Hence, if migration is profitable for one unemployed worker, there is full migration of all unemployed workers from the one region to the other region and vacancies are posted in that good region only[8].

Therefore, the equilibrium values of being unemployed are (substituting with the job creation condition, using Nash bargaining first order condition):

In the full migration equilibrium:

$$U_g^* = \frac{b + \left(\frac{\beta}{1-\beta}\left(c_r\theta_g^* + c_f m(\theta_g^*)(1 - F(\underline{x}_g^*))\right)\right) + \lambda c_m,}{r} \tag{3.32}$$

In the zero migration equilibrium:

$$\begin{aligned} U_g^* &= \frac{1}{(r+2\lambda)} \quad (r+\lambda)\left[b + \left(\tfrac{\beta}{1-\beta}\left(c_r\theta_g^* + c_f m(\theta_g^*)(1 - F(\underline{x}_g^*))\right)\right)\right] \\ &\qquad +\lambda\left[b + \left(\tfrac{\beta}{1-\beta}\left(c_r\theta_b^* + c_f m(\theta_b^*)(1 - F(\underline{x}_b^*))\right)\right)\right], \end{aligned} \tag{3.33}$$

$$\begin{aligned} U_b^* &= \frac{1}{(r+2\lambda)} \quad (r+\lambda)\left[b + \left(\tfrac{\beta}{1-\beta}\left(c_r\theta_b^* + c_f m(\theta_b^*)(1 - F(\underline{x}_b^*))\right)\right)\right] \\ &\qquad +\lambda\left[b + \left(\tfrac{\beta}{1-\beta}\left(c_r\theta_g^* + c_f m(\theta_g^*)(1 - F(\underline{x}_g^*))\right)\right)\right], \end{aligned} \tag{3.34}$$

Lemma 3.2 *$\theta_g^* \geq \theta_b^*$ and $\underline{x}_g \leq \underline{x}_b \Rightarrow U_g^* \geq U_b^*$.*

Proof. Straightforward. ■

Proposition 3.4 *In equilibrium, migration occurs only from the bad to the good region.*

Proof. Straightforward. ■

[8] This property is the consequence of the constant-returns-to-scale of the matching function. Furthermore, the expected marginal product of an extra match does not decrease with the employment of the corresponding region. One could have a less extreme implication by introducing a fixed factor of production (e.g. land) that introduces a decreasing marginal return to the value of posting an extra vacancy. This would not change the main results.

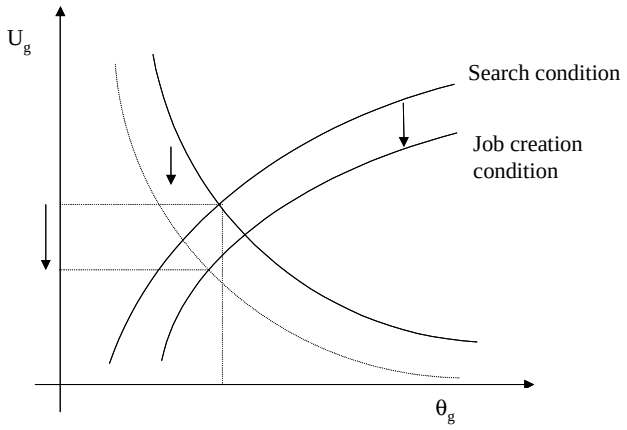

Figure 3.2: Equilibrium on the labor market

3.3.7 Equilibrium on the labor market

The equilibrium values $\{\theta_g^*, \theta_b^*, \underline{x}_g^*, \underline{x}_b^*, \widetilde{x}, U_g^*, U_b^*\}$ can now be determined. They solve the system of equations formed by the job creation condition (equation [3.27]), the search condition (equations [3.32], [3.33] and [3.34]) and the thresholds conditions ([3.19],[3.22] and [3.23]).

The effect of employment protection can be pictured in a graph representing the job creation and search conditions (Figure 3.2). Employment protection has a negative effect on vacancy posting, i.e. it pushes the job creation condition downwards but it has an ambiguous effect on the search condition. Furthermore, the migration cost and the economic homogeneity decrease the share of dying jobs, which are the most affected by employment protection. Therefore, the lower the migration costs and the larger the economic heterogeneity, the larger the downward shift of the job creation curve. And therefore, the most likely the value of being unemployed decreases with employment protection.

Given the Markov process inherent to the economy, the values of unemployment and employment fluctuate. However they have some important properties. First, their evolu-

tion is stationary and, second, the stationary values are independent of the initial condition. The next paragraphs provide the details.

In the full migration equilibrium, all unemployed workers are searching for a job in the good region. The expected evolution of the aggregate unemployment rate is therefore:

$$E_t[\dot{u}(t)] = -u(t)m(\theta_g^*(t))(1 - F(\underline{x}_g^*)) + \delta l^s(t) + (\lambda + \delta - \delta\lambda)l^d(t), \tag{3.35}$$

where $\dot{u}(t)$ is the evolution of unemployment rate at time t, $l^s(t) = l^s(t,g) + l^s(t,b)$ is the total employment in surviving jobs (sum of the surviving employment in the region that is in a good state at time t and in the region that is in a bad state at time t) and $l^d(t)$ is the dying employment at time t. The evolution of the aggregate dying employment rate has the following expectation:

$$E_t[\dot{l}^d(t)] = u(t)m(\theta_g^*(t))(F(\widetilde{x}^*) - F(\underline{x}_g^*)) - (\lambda + \delta - \delta\lambda)l^d(t), \tag{3.36}$$

The evolution of the aggregate surviving employment rate (good and bad regions) has the following expectation:

$$E_t[\dot{l}^s(t)] = u(t)m(\theta_g^*(t))(1 - F(\widetilde{x}^*)) - \delta l^s(t), \tag{3.37}$$

The total labor force remains constant over time, which implies:

$$u(t) + l^s(t) + l_g^d(t) = 1, \tag{3.38}$$

In the zero migration equilibrium unemployed workers remain in their region, even if it is in a bad state. This means that firms create vacancies also in this region. Let us denote $u(t,w)$ as the regional unemployment rate of a region that is in the state of the world w at time t ($y(t) = y(t,b) + y(t,g)$) The evolution of the regional unemployment rate has therefore the following expectation:

$$\begin{aligned} E_t[\dot{u}(t,g)] \;=\; & -(1-\lambda)u(t,g)m(\theta_g^*(t))(1 - F(\underline{x}_g^*)) \\ & -\lambda\left[u(t,g)m(\theta_b^*(t))(1 - F(\underline{x}_b^*)) - (1-\delta)l^d(t,g)\right] \qquad (3.39) \\ & +\delta(l^s(t,g) + l^d(t,g)), \qquad (3.40) \end{aligned}$$

where $l^s(t,g)$ is the employment rate in surviving jobs in a region that is in the good state at time t.

$$\begin{aligned} E_t[\dot{u}(t,b)] &= -(1-\lambda)u(t,b)m(\theta_b^*(t))(1-F(\underline{x}_b^*)) \\ &\quad -\lambda u(t,b)m(\theta_g^*(t))(1-F(\underline{x}_g^*)) \qquad (3.41) \\ &\quad +\delta l^s(t,b), \qquad (3.42) \end{aligned}$$

where $l^s(t,g)$ is the employment rate in surviving jobs in a region that is in the bad state at time t.

The evolution of the dying employment rate has the same expectation as in the full migration equilibrium, except that the unemployment pool is reduced to the number of unemployed present in the region that is in a good state, so that the unemployment rate in the expression must be replaced by $u(t,g)$.

Let us denote by $l^{R,s}(t,w)$ the regional employment rate in surviving jobs in a region that is in state w at time t. The evolution of the surviving regional employment rate has the following expectation:

$$\begin{aligned} E_t[\dot{l}^{R,s}(t,g)] &= (1-\lambda)u(t,g)m(\theta_g^*(t))(1-F(\widetilde{x}^*)) \\ &\quad +\lambda u(t,g)m(\theta_b^*(t))(1-F(\underline{x}_b^*)) - \delta l^{R,s}(t,g), \qquad (3.43) \\ E_t[\dot{l}^{R,s}(t,b)] &= (1-\lambda)u(t,b)m(\theta_b^*(t))(1-F(\underline{x}_b^*)) \\ &\quad +\lambda u(t,b)m(\theta_g^*(t))(1-F(\widetilde{x}^*)) - \delta l^{R,s}(t,b), \qquad (3.44) \end{aligned}$$

An important property of these variables is that they are stationary. This means that there exists a unique set $\{u(t), l^s(t), l^d(t)\}$ such that $E_t[\dot{u}(t)] = E_t[\dot{l}_g^s(t)] = E_t[\dot{l}_g^d(t)] = 0$ such that:

In the full migration equilibrium:

$$\begin{aligned} \overline{l}^d &= \frac{m(\theta_g^*(t))(F(\widetilde{x}^*)-F(\underline{x}_g^*))}{\lambda+\delta-\lambda\delta}\overline{u}, \qquad (3.45) \\ \overline{l}^s &= \frac{m(\theta_g^*(t))(1-F(\widetilde{x}^*))}{\lambda+\delta-\lambda\delta}\overline{u}, \qquad (3.46) \\ \overline{l}^d + \overline{l}^s + \overline{u} &= 1, \qquad (3.47) \end{aligned}$$

and in the zero migration equilibrium:

$$\begin{aligned}
\overline{l}_g^{R,s} &= \frac{(1-\lambda)m(\theta_g^*(t))(1-F(\widetilde{x}^*)) + \lambda m(\theta_b^*(t))(1-F(\underline{x}_b))}{\delta}\overline{u}_g, \\
&\qquad (3.48)\\
\overline{l}_b^{R,s} &= \frac{(1-\lambda)m(\theta_b^*(t))(1-F(\underline{x}_b)) + \lambda m(\theta_g^*(t))(1-F(\widetilde{x}))}{\delta}\overline{u}_b, \\
&\qquad (3.49)\\
\overline{l}^d &= \frac{(1-\lambda)\overline{u}_g + \lambda\overline{u}_b}{\lambda+\delta-\lambda\delta}m(\theta_g^*(t))(F(\widetilde{x}^*) - F(\underline{x}_g^*)), \qquad (3.50)\\
\overline{l}_g^{R,s} + \overline{u}_g + \overline{l}^d &= \frac{1}{2}, \qquad (3.51)\\
\overline{l}_b^{R,s} + \overline{u}_b &= \frac{1}{2}, \qquad (3.52)
\end{aligned}$$

with $l^s(t) = l^{R,s}(t,g) + l^{R,s}(t,b)$ and $u(t) = u(t,g) + u(t,b), \overline{l}_g^{R,s}, \overline{l}_b^{R,s}, \overline{u}_g, \overline{u}_b$ are respectively the stationary values of the employment in a region that is in a good state, the employment in a region that is in a bad state, the unemployment in a region that is in a good state and the unemployment of a region that is in a bad state.

3.3.8 Voting for employment protection

The tools

The values of working and the values of being unemployed determine the preferences of the workers. It is interesting to compare the roles of migration and employment protection on these preferences.

Let us first look at the equilibrium values of being unemployed.

In the full migration equilibrium:

$$U_g^* = \frac{b + \left(\frac{\beta}{1-\beta}\left(c_r\theta_g^* + c_f m(\theta_g^*)(1-F(\underline{x}_g^*))\right)\right) + \lambda c_m,}{r} \qquad (3.53)$$

In the zero migration equilibrium:

$$\begin{aligned} U_g^* &= \frac{1}{(r+2\lambda)} \begin{array}{l} (r+\lambda)\left[b+\left(\frac{\beta}{1-\beta}\left(c_r\theta_g^*+c_f m(\theta_g^*)(1-F(\underline{x}_g^*))\right)\right)\right] \\ +\lambda\left[b+\left(\frac{\beta}{1-\beta}\left(c_r\theta_b^*+c_f m(\theta_b^*)(1-F(\underline{x}_b^*))\right)\right)\right], \end{array} \qquad (3.54) \\ U_b^* &= \frac{1}{(r+2\lambda)} \begin{array}{l} (r+\lambda)\left[b+\left(\frac{\beta}{1-\beta}\left(c_r\theta_b^*+c_f m(\theta_b^*)(1-F(\underline{x}_b^*))\right)\right)\right] \\ +\lambda\left[b+\left(\frac{\beta}{1-\beta}\left(c_r\theta_g^*+c_f m(\theta_g^*)(1-F(\underline{x}_g^*))\right)\right)\right], \end{array} \qquad (3.55) \end{aligned}$$

In both equilibria, unemployed workers face a trade-off between a high job finding rate (with presumably low employment protection) and future insider gains. It is expected that the larger the economic heterogeneity and the smaller the migration costs, the more likely unemployed prefer high job finding rates to insider gains.

Let us now turn to the values of being employed. First, consider the case of employed workers in a good region and in a surviving job:

$$W_g^s(x) = \frac{(r+\delta+\lambda)\left(w_g^s(x)+\delta\overline{U}_g\right)+\lambda(w_b(x)+\delta\overline{U}_b)}{(r+\delta)(r+\delta+2\lambda)}, \qquad (3.56)$$

Employment protection gives them some insider power but also reduces the value of their outside option.

In bad regions, surviving jobs lead to the following values of being employed:

$$W_b(x) = \frac{(r+\delta+\lambda)\left(w_b(x)+\delta\overline{U}_b\right)+\lambda(w_g^s(x)+\delta\overline{U}_g)}{(r+\delta)(r+\delta+2\lambda)},$$

Employment protection plays the same role as in the surviving jobs in a good region.

Finally, let us consider employed workers in dying jobs (in a good region only):

$$W_g^d(x) = \frac{w_g^d(x)+\delta\overline{U}_g+\lambda\overline{U}_b}{r+\delta+\lambda}, \qquad (3.57)$$

Here, the outside option of the unemployed workers matters for the bargaining at the beginning of the employment relationship but more than the other workers, for the future, since these workers know their jobs will be destroyed as soon as the region falls into a slump.

Let us now turn to the numerical example.

3.4 A numerical example

This section solves the model explicitly for several configurations of parameters. The easiest way to illustrate the mechanisms of the model is to choose two configurations of parameters where the only difference between them lies for example in different migration costs (basic example) or in different economic heterogeneity (sensitivity analysis) generating a full migration equilibrium (featuring the American case) and a zero migration equilibrium (featuring the European case). Then one can show that these two migration equilibria generate different political equilibria, or at least, different preferences with respect to employment protection legislation.

3.4.1 Basic example

Our basic numerical example is based on the following assumptions. First, $f(x)$ is assumed to be a uniform distribution defined on the interval $[0, 1]$. The model is solved under two different systems: without employment protection ($c_f = 0$) and with employment protection ($c_f = 0.2$), this for two different values of the migration cost (one where $c_m = 0$ such that all unemployed workers find it profitable to migrate and the other one where $c_m = [U_g^*]^z - [U_b^*]^z$ such that workers do not find it profitable to migrate) The matching function is assumed to take the following form: $m(\theta) = a\theta^\alpha$. The parameters are summarized in Table 3.1.

Remember that 1 is the maximum match-specific productivity. To understand what these parameters mean, it is useful to translate the model into a discrete time equivalent with a period being equal to half a year. The expected duration of a boom would then be around 5 years. The differential between the region is equal to the maximum specific productivity. The two migration costs used are $c_m = 0$ and $c_m = 1.64$ such that migration is profitable in the first case but is not in the second.

Parameter	Value
Recruitment cost c_r	1
Discount rate r	0.05
Matching elasticity α	0.5
Matching efficiency a	1
Worker's relative bargaining power β	0.5
Probability of a transition λ	0.1
Probability of job-specific shock	0.01
Regional productivity increment ε_g	1
Value of leisure / unemployment benefit b	0.05
Migration cost FM - ZM	0, 1.64

Table 3.1: Parameter values

	ZM		FM	
	No EPL	EPL	No EPL	EPL
$\underline{x}_g$	0.36	0.40	0.20	0.25
$\widetilde{x}$	0.56	0.55	0.82	0.80
$\underline{x}_b$	0.56	0.57	0.82	0.82
θ_g	1.31	1.17	1.15	0.99
θ_b	0.64	0.58	-	-
$\overline{u}(\%)$	2.3	2.4	3.8	3.8
$\overline{l}^s(\%)$	95.6	96.1	73.3	77.0
$\overline{l}^d(\%)$	2.1	1.5	22.9	19.2

Table 3.2: Characteristics of the economy

Table 3.2[9] describes the characteristics of the economy under each system and then looks at the preferences of the workers. In this example, the share of dying jobs is larger in the FM equilibrium. This means that there is much more efficient labor reallocation in the FM equilibrium than in ZM equilibrium. Hence, the equilibrium flows out of and into unemployment are larger in the country that has the lowest migration cost. Employment protection reduces job creation (through its negative effect on vacancy posting and its positive effect on the productivity required at entry) and job destruction (through its negative effect on the firing productivity floor $\widetilde{x}$). It therefore reduces the equilibrium flows out of and into unemployment. These differences do not take other institutional differences into account, such as the unemployment benefit system, the unions or the labor taxes. These institutions are usually considered as the one responsible for the high unemployment rates in Europe. What Table 3.2 means is that a more turbulent economy has a larger equilibrium unemployment rate than a relatively stable economy.

The economy is simulated over time. The evolutions of dying and surviving employment, and unemployment are shown in Figures 3.3, 3.4 and 3.5. It is clear that the fluctuations are much larger in the FM equilibrium. The respective shares of dying, surviving bad and good employment rates are stable in the ZM equilibrium while they experience large fluctuations in the FM equilibrium. Let us now turn to the political preferences of the individuals.

Figures 3.6 and 3.7 plot the value functions for the workers in both systems, against the match-specific productivity x. The dashed line corresponds in all graphs to the asset value being in a given state of the labor market (unemployed or employed in a dying or surviving job, depending on the value of s), in the absence of employment protection (i.e. $c_f = 0$), as a function of his position on the labor market (his position changes with x from unemployed to employed in a dying job and, finally, employed in a surviving job). The continuous line on the other hand plots the asset value of being in a given state of

[9] $\overline{y}$ is the stationary value of y.

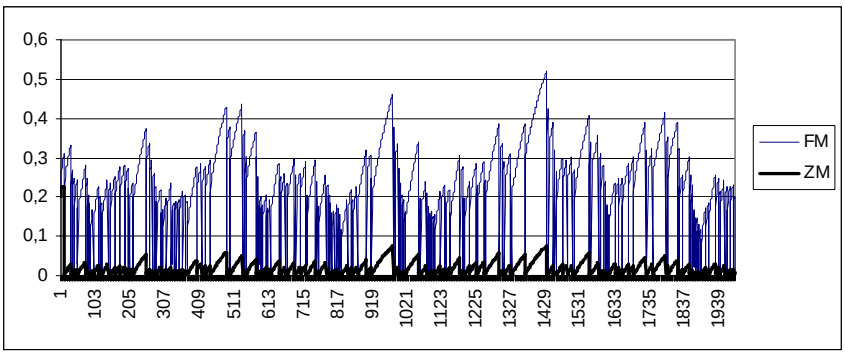

Figure 3.3: Dying employment rates

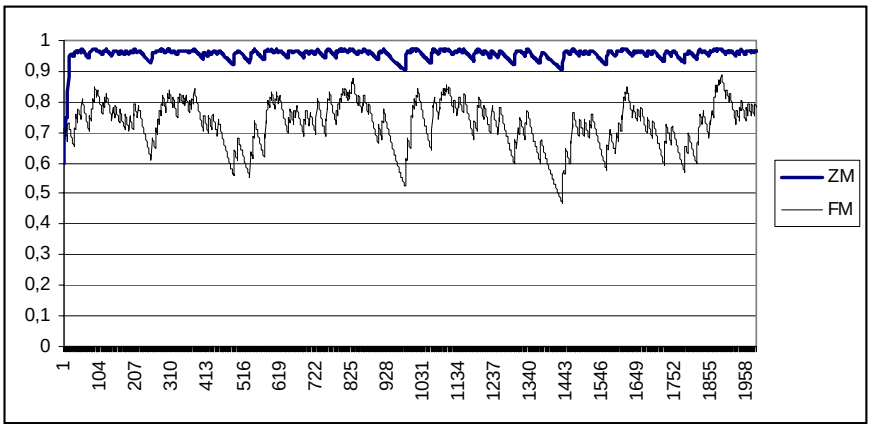

Figure 3.4: Surviving employment rates

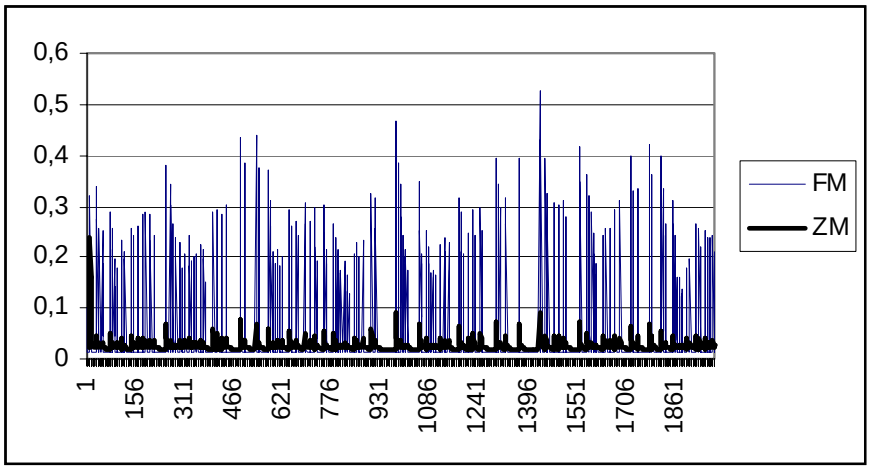

Figure 3.5: Unemployment rates

the labor market in the presence of employment protection ($c_f = 0.2$). They include all categories of workers, except the unemployed who did not match with any firm. The asset value for these unemployed corresponds however exactly to the asset value of the unemployed who did get a match but not productive enough to lead to a contract.

Figures 3.6 and 3.8 present to the value functions in the good region in the FM and ZM equilibria respectively and Figures 3.7 and 3.9 present the value functions in the bad region for both equilibria again. It is clear that unemployed are better off without employment protection, in both equilibria. Unemployed workers care more about finding a job in the present than enjoying insider gains in the future. Employed workers who would be in a dying job without employment protection and unemployed if there was employment protection also prefer no employment protection in either equilibrium. All other employed workers on the other hand differ in their preferences in the two situations. In the FM equilibrium, they all would vote against employment protection, while in the ZM equilibrium, the most productive workers in dying jobs and all the workers in surviving jobs would vote in favor of it. Since the median voter is most likely employed in a surviving job, one expects that these two economies, differing only through their

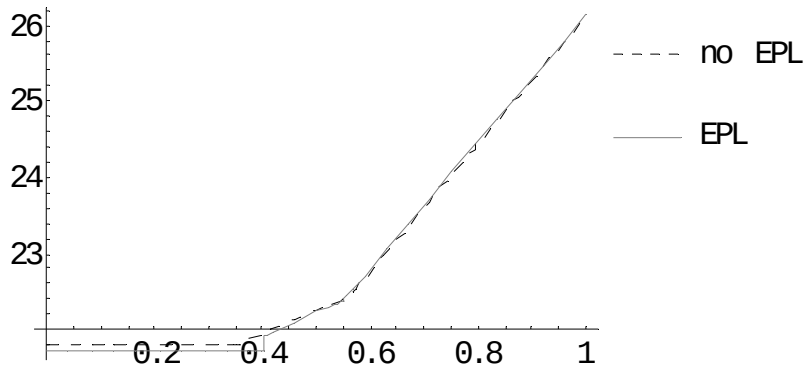

Figure 3.6: Values in good region - ZM equilibrium

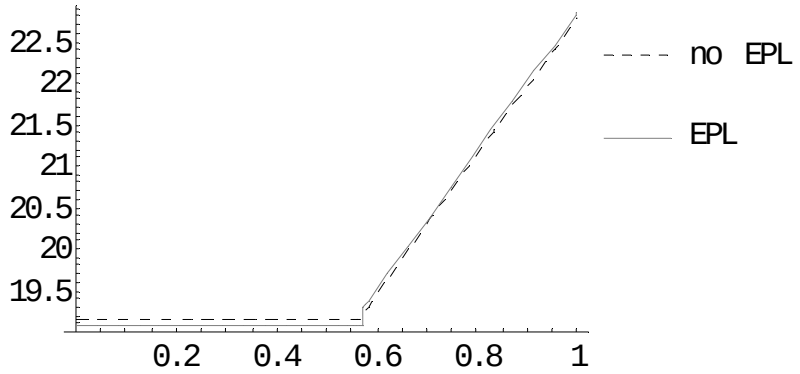

Figure 3.7: Values in bad region - ZM equilibrium

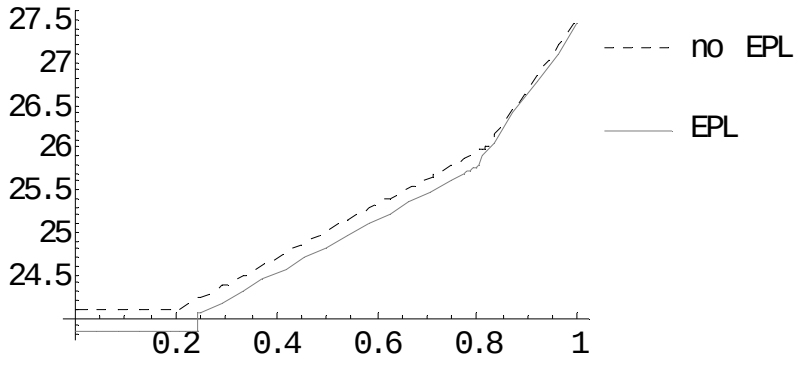

Figure 3.8: Values in good region - FM equilibrium

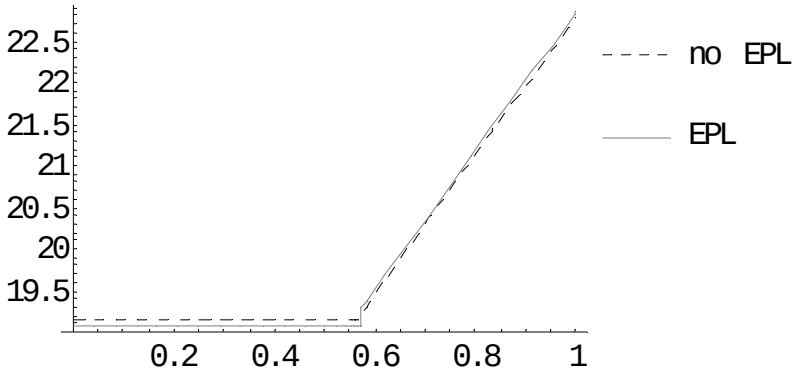

Figure 3.9: Values in bad region - FM equilibrium

migration cost will support different political equilibria.

This example shows then that the same configuration of parameters can lead to very different preferences with respect to the employment protection system depending on the migration possibilities. In this example, if the migration cost is higher than 1.64 workers do not find it worthwhile to migrate to the neighboring region in order to find a job. Hence, if the migration cost is somewhat larger than the productivity differential it is not profitable to move and the majority of workers prefers employment to be protected by a firing cost.

Furthermore, the two sides of the relationship between migration and employment protection are established: The difference between the two equilibria indicate that a lower migration cost makes employment protection less attractive. The difference between the two last columns of Table 3.2 shows that a stronger employment protection reduces the number of workers migrating (since the proportion of dying jobs is the lowest with employment protection and all fired workers migrate).

3.4.2 Sensitivity analysis

Modifying parameters λ and ε

In addition to the migration costs, it is argued that the degree of economic heterogeneity plays an important role in determining the preferences of the workers. In the model, this would be interpreted as a high ε. As mentioned before, a high degree of economic heterogeneity increases the share of dying jobs, which are the most hit by employment protection legislation. The simulations show that a higher degree of economic heterogeneity increases the share of dying jobs and therefore, decreases the support for employment protection in the ZM equilibrium.

Also interesting for the purpose of this Chapter, the parameter λ determines the political preferences. In some European countries (as Italy, Spain or Germany), persistent productivity differentials are observed (together with wage and unemployment differentials). In this model this would imply that λ becomes close to 0, i.e. that regions remain permanently in the same state of the world. This implies that the distinction between dying and surviving employment does not mean nothing anymore. All employed workers are in surviving jobs. In the ZM equilibrium, the steady-state share of surviving jobs of reaches 97.8%, leaving 2.2% workers unemployed. In the FM equilibrium, 99.9% of workers are employed and 0.1% workers unemployed. The political preferences remain in essence the same as in the previous paragraph. This means that countries with large and persistent differentials, where it is not profitable to migrate, are likely to provide a strong support to employment protection.

Modifying the political choice

The example assumed a simple choice between no employment protection and employment protection. The political choice in the real world is certainly more complex than that. What is important is that this simple example leads to the following conclusion: Ceteris Paribus (i.e. given a configuration of parameters), countries with a relatively

low migration cost demand a lower level of employment protection than countries with a high migration cost. The configuration of parameters determine the level of employment protection that is preferred. Hence, it was shown that when the regional productivity differentials were low some workers would prefer to have some employment protection.

3.5 Discussion

3.5.1 Negatively correlated shocks and political entity

Migration and employment protection are inter-related to the extent that one considers the same entities for one and the other, i.e. what determines the preferences of workers with respect to employment protection is the extent to which migration is profitable *within* the country (if one supposes that the country is the level at which employment protection is set). What the model can tell concerning the European Union is that if employment protection would be fixed at the European level rather than at the country level there would probably be no desire for lower protection. Indeed, Europe is a larger economic space with a larger economic heterogeneity which would tend to reduce the support for EPL. However the cultural and language differences between European countries are even more important than at the country level, which implies that the migration costs would probably be much higher. This would tend to increase the support for EPL.

3.5.2 Interaction with other institutions

Saint-Paul (1997) argues that the reason why Europeans desire a higher level of employment protection lies in the existence of other institutions, such as powerful unions. One may displace the question one step back and ask why do the Europeans have stronger unions? Indeed, the forces leading to the existence of powerful unions are likely to be similar to the forces leading to the existence of employment protection. The argument used in this Chapter could be used to justify differences in institutions influencing job

creation and insider gains in the same way as employment protection. Hence, generous unemployment insurances (leading to high taxes on labor through a social security budget constraint) and strong unions can also be thought as institutions deterring vacancy posting while providing workers with insider gains. There are number of studies pointing out the differences between the US and Europe from these perspectives (see Hassler et al. (2001) for a recent contribution on the differences in unemployment insurance systems and Wallerstein (1989) for a contribution on the differences in unions structure). Wallerstein observes that there is a negative relationship between the size of the country and the degree of unionization. His argument is that the proportion of the labor force unionized determines the gains from unionization while the size of the labor force determines the costs of unionization (organizational costs). Hence, smaller countries are characterized by stronger unions.

3.5.3 Firing costs and severance payments

This Chapter considers the firing cost as a pure waste for the firm and the society. However, employment protection also includes rules guiding the severance payments from the firm to the worker (see OECD (1999)). Adding this type of firing cost would not change nothing to the results. The reason is that a severance payment reduces the bargained wages and constitute therefore a kind of forced saving. In this framework, the worker would be completely indifferent between a system with or without severance payment.

3.6 Conclusion

The objective of this Chapter was to explain the observed differences in employment protection between the United States and European countries. The explanation provided here is that migration does not work as well as an income protection device in Europe than in the United States. There are two reasons for that: First, the United States form a

large country, with a high degree of economic diversity. Most European countries are small and definitely more homogenous than the United States. Second, even in the presence of economic incentives to migration within their country, Europeans do not respond with migration. This suggests that there are important migration costs, that can be linked to institutional structures (such as housing regulations or other welfare support systems) or social and cultural barriers.

The argument is that economic heterogeneity and migration costs play a crucial role in determining the preferences of workers with respect to employment protection. Employment protection typically reduces the job finding and firing rates and therefore increases the effective migration costs. Hence, when the structure of the country is such that migration would be attractive, workers are likely to support a system without employment protection. If it is not, on the other hand, workers prefer enjoying insider gains and safe jobs.

The model provides an interesting prediction with respect to the European Union. According to the empirical evidence, Euro-Land is more heterogeneous than the United States. This means that if employment protection would be decided at the European level, it could be that it is not as strongly supported by the workers as before. However, as long as some large social and cultural differences would subsist, it would be maintained strong. Similarly, the implementation of a reform of the employment protection system (if one would be convinced that is welfare-improving) would be much easier to implement in a society made more mobile than in a society where workers are very much attached to their local roots.

Chapter 4

Employment Protection, Migration and Tertiary Education

This Chapter is based on the paper "Migration, Skill acquisition and Employment Protection" (Belot (2002))[1].

4.1 Introduction

Chapter 3 reported facts showing that countries with a relatively strict employment protection are also relatively less mobile. This Chapter completes the argument of Chapter 3 by introducing heterogenous agents. Indeed, the facts show that migration rates vary a lot across individuals and, in particular, between low-skilled and high-skilled workers. This indicates that the migration opportunities or the profitability of migration vary across skill types. Furthermore, the facts also show that high-skilled and low-skilled workers are not shared equally across contract types (with low employment protection and with high employment protection). This suggests that different skills call maybe for different types of contract. Chapter 3 focused on the differences between the US and Europe. Also from the point of view of skill acquisition, they differ a lot. The United States have an educa-

[1]While remaining responsible for errors, the author would like to thank Jan van Ours for his valuable comments.

tion system that relies much more on private funds and have a relatively better educated education. This Chapter proposes an explanation of why this could be the case.

This Chapter argues that institutions and regulations should be designed as a set of interacting elements. It shows that the effects of employment protection legislation on labor market performance or welfare depend on essential characteristics of the countries and individuals it is applied to. The conclusion is that employment protection legislation can be justified in some countries and for some individuals. Of course, the characteristics of these countries and these individuals (for example, skills) are also part of public policy. Therefore, this Chapter provides also an illustration of how public policies should be designed together, and shaped to each other.

Employment protection legislation (EPL) has been developed so as to protect workers against negative shocks. The consequence is that some low productive activities are (inefficiently) maintained and the duration of jobs is much longer in countries with EPL than without EPL. In Chapter 3, it is argued that the political support of EPL in Europe comes from the unattractiveness of migration as an income protection device, compared to the United States. In short, Europeans have nowhere to go and therefore the median voter, who is most likely an employed worker, prefers his job to be protected even if it means that his average wage is lower than otherwise (because of being maintained in low productive activities) and that the unemployment spells are longer. This argument is elaborated here, by assuming that all individuals are not equal with respect to their migration needs. Indeed, high-skilled workers often have specialized skills (Wildasin (2000)) which implies that they probably need to migrate more often. Low-skilled workers can much more easily find an equivalent low-skilled job without having to move out of their region. This implies that employment protection legislation should maybe shaped to the characteristics of the individuals in countries where migration is not so profitable. The next step is then to investigate how employment protection and migration opportunities determine the decision to acquire these specialized skills. If acquiring these specialized skills means

having to bear a migration cost relatively often, it may not be very attractive to invest in this type of education in countries where this migration cost is high. Employment protection legislation, subsidies to migration and direct subsidies to investments in tertiary education are the most obvious public policies that could be used to stimulate this type of investments (supposing that it has some positive social returns). And indeed, European countries are the ones with the strictest EPL and the largest share of public funding of tertiary education.

Hence, this Chapter investigates further some linkages between three elements: Employment protection, migration and skill acquisition (see also Table 1.14 for an overview of the links covered in this manuscript). The literature and this dissertation in particular has already investigated some linkages between these elements. First, employment protection has a negative effect on the migration rates (Chapter 3 but also Schettkat (1997) for an empirical assessment). Second, migration opportunities have a negative effect on the preferences and needs for employment protection (Chapter 3). Third, high-skilled and low-skilled workers call for different types of employment protection (Chapter 5 for a link between skills and optimal employment protection, this Chapter for a link between skills and the political support for EPL). Fourth, skills are attached to different types of migration behaviors. High-skilled workers migrate much more than low-skilled ones (this Chapter, the literature on the brain drain and a more recent literature for migration rates within or between developed countries). Fifth, employment protection and migration opportunities determine the acquisition of skills (this Chapter and the literature on the brain "gain").

The Chapter is structured as follows. Section 4.2 presents facts on these three elements and then relate the literature on the relationships that have already been investigated. Section 4.3.1 presents the model designed so as to study the effects of migration costs on the investments in education, and the effects of three possible policies (employment protection legislation, public financing of tertiary education and subsidies to migration).

Section 4.5 discusses the essential assumptions of the model. Finally, Section 4.6 concludes.

4.2 Employment protection, education and migration : Theory and empirical studies

Employment protection legislation is a set of regulations that makes it harder for a firm to get rid of its workers. Section 1.2.2 (Table 1.11) describes the evolution over time and the differences in EPL across OECD countries. The relevant aspect for this study is that the United States have a much more flexible regulation than most European countries.

Chapter 3 argues that geographic labor mobility determines the preferences for EPL. Countries with high migration costs and low economic heterogeneity would make migration less attractive as an income protection device and would therefore support a stricter employment protection legislation. The causality goes also in the other direction, as employment protection reduces migration incentives (Schettkat (1997), Chapter 3). Hence, we usually observe that countries with the strictest employment protection legislation are also the ones with the lowest inter-regional migration rates (Thomas (1994), Decressin and Fatas (1995)). Interesting for the purpose of the Chapter, workers seem to be unequally spread across contract types. Bentolila and Dolado (1994) argue that temporary employment prevails among individuals with a low attachment to the labor force. De Grip et al. (1997) note that sixty-three percent of all temporary employed are in low-skilled occupations. Chapter 5 of this dissertation proposes an explanation for this. By introducing investments in specific human capital, it shows that employment protection can be welfare improving. Furthermore, it shows that high-skilled workers are more likely to invest in this specific human capital than low-skilled ones. This means that the optimal employment protection (from a welfare point of view) depends on the skills of the workers.

Let us now turn to the education decision. High-skilled workers are defined here as

	Public funds Share of GDP (%)	Private funds Share of GDP (%)	Share private in education funding (%)	Share public in education funding (%)	Tertiary educated[a)] (%)
Japan	0.3	0.5	37.5	62.5	
United States	1.3	1.1	54.2	45.8	31
Spain	0.8	0.2	80.0	20.0	13
Ireland	1.3	0.3	81.3	18.7	17
Australia	1.9	0.4	82.6	17.4	23
France	0.9	0.1	90.0	10.0	16
Canada	2.4	0.1	96.0	4.0	41
New Zealand	1.4	0	100	0	24
Denmark	2	0	100	0	19
The Netherlands	1.8	0	100	0	21
Sweden	1.6	0	100	0	24

Source: OECD (1995), [a)]Share of the population 25-64

Table 4.1: Public expenditures in tertiary education (in percent)

workers who have acquired a tertiary education before entering the labor market and in particular, that this education has brought them a comparative advantage in the performance of a given task. This definition goes in the same direction as Wildasin (2000). Again, we find that the United States have on average a better educated labor force (see Table 4.1). When one looks at the respective public and private contributions to the educational system, one finds that the United States rely much more on private investments than on public subsidies (see Table 4.1). In particular, the private contribution in tertiary education is almost 50%, against 10% for France, 20% for Spain or 0% for Sweden.

Human capital theory (Mincer (1974), Becker (1964)) says that the decision of investing in human capital depends on the gains and costs associated with human capital investments. The gains are the improvements in terms of labor market performance and the costs are direct (tuition, fees) and indirect (foregone earnings) (see also McKenna (1996) for a unified model on education and unemployment). The improvements in terms

of labor market performance are usually thought as twofold: Higher earnings (due to the higher productivity) and higher employability (in particular, high skilled workers can also apply to low-skilled jobs while low skilled workers cannot perform high skilled tasks, e.g. McKenna (1995)). Coming back to the theme of this Chapter, there is some literature showing how employment protection and migration determine the investments in education. This Chapter and Chapter 5 show indeed that employment protection stimulates investments in human capital prior to the entry into the labor market (Chapter 4) and on-the-job (Chapter 5). Also there is a literature in development economics showing that migration opportunities stimulate the investments in education. Stark and Wang (2001) for example rely on the assumption that the returns to private investments in human capital depend on the average level of human capital of the country in which the worker is working. Hence, in poor countries, the level of human capital is low and so are the returns to human capital investments. The opening of these countries to migration towards countries with higher levels of human capital stimulate investments in education. As long as migration policies limit the extent to which workers can migrate, opening the country to migration can be welfare-enhancing (since all workers including the ones staying will invest more in human capital). This Chapter suggests that this causality also exist in the developed world but based on another argument: High-skilled workers need to migrate more often and therefore, migration opportunities stimulate investments in education.

Let us now finally turn to the migration decision. It is easier to relate facts on geographical labor mobility than on migration between different job types. However this Chapter applies to both types of migration. Spatial migration should be understood here as a change in residence between two regions. Migration rates vary enormously between countries. As mentioned above, inter-regional migration rates are much larger in the United States than in European countries. The reason could be that there are higher migration costs in Europe than in the United States. It could also be that these migration costs are linked to the institutional framework (see Chapter 3, Hassler et al.(2001)).

The literature and this dissertation in particular have explored the relationships between employment protection, skills on the one hand and migration on the other hand. Hence, when relating skills to migration rates in the developed world, what is usually observed is that high-skilled workers are relatively more mobile than low-skilled workers[2] (e.g. Wildasin (2000) for the United States, Mauro and Spilimbergo (1998) for Spain and Gianetti (2001) all mention the relatively low migration rates of low-skilled workers and the relative high response of high-skilled workers to regional shocks). Why do high-skilled workers find it more profitable to migrate than low-skilled workers? It could be that they differ in migration costs. Indeed, high-skilled workers are also often the ones who speak another language or have better qualities of adaptation. It could also be that the costs in absolute terms do not differ between the two types of workers but only in relative terms. High-skilled workers are relatively richer and so are less constrained by this migration cost. It could also be that low-skilled workers are limited in their migration incentives by borrowing constraints. The second explanation could be that there are important differences in the migration gains. Gianetti (2001) shows that when one assumes that skills are complementary, i.e. that the return to high skills is higher when the average level of human capital is high, high-skilled workers migrate towards regions where the level of human capital is already high. Given their wages, high skilled workers are also the only ones who find it profitable to do so. A related literature shows that the labor mobility of high-skilled workers may present disincentives for local authorities to finance higher education as they are not guaranteed to benefit from their investment (see Justman and Thisse (1997)).

Furthermore, as already mentioned earlier, employment protection has been empirically found as reducing the probability of migrating. And with respect to labor mobility in general, employment protection would indeed reduce the labor market flows between

[2] We observe to some extent a similar trend in the migration rates from developing to developed countries (the brain drain) but the proportion of low-skilled workers migrating to developed countries is also quite important.

various states of the labor market, slowing the reallocation process down.

4.3 The model

4.3.1 Basic framework

The objective of the model is to emphasize the effects of migration costs on the education decision, when acquiring education means acquiring a comparative advantage in the performance of a given task, for which the demand fluctuates across time and space. A particularity of this model is that one job is defined by a given task and that once this task is hit by a negative demand shock, the firm and the worker can find it efficient to separate.

We assume that there is only one high-skilled task and an infinity of low-skilled tasks. The demand for the different tasks can either be in a good or in a bad state. There are two regions that are defined by their perfect negative correlation with respect to the state of the demand for the high-skilled task[3].

Workers can migrate across these regions. For each move, they incur a migration cost c_m. These costs can be thought of as the costs of buying and selling a house, the psychological cost of leaving the family and familiar surroundings, etc. The cost is fixed and exogenous. In particular, the migration cost is the same for every level of education[4].

[3]This assumption guarantees that at any point in time, a high-skilled worker living in a region for which the demand for the high-skilled task is in a bad state has the opportunity to emigrate from that region and apply in the other region to a high-skilled job for which the demand is in a good state. The difference with low-skilled workers the model should capture is that the latter do not have to incur this migration cost in order to apply to vacancies for good low-skilled jobs. The easiest way to do this is to assume that there is an infinity of low-skilled tasks so that as soon as one low-skilled task is in a bad state, the low-skilled workers can apply to another low-skilled task (in a good state) without having to incur the migration cost. Therefore, it is not necessary to assume any kind of relationship between the states of the world of the low-skilled task in one region and the other.

[4]This seems a strong assumption. In particular, it is sometimes argued that low-skilled workers have lower migration costs than high-skilled workers. In the model, low-skilled workers do not have incentives to migrate, no matter how high the migration costs are, as by assumption they can find an equivalent job in the same region.

Low-skilled tasks can be performed by anyone while the high-skilled task can only be performed by high-skilled workers. The high-skilled task requires special skills or knowledge that can only be acquired through tertiary education. The essential difference between low-skilled and high-skilled workers is that the latter have acquired specialized knowledge enabling them to perform the high-skilled task[5]. At each point in time, n new workers enter the labor force and n workers die. The labor force is therefore constant and normalized to 1. The participation decision or retirement decision are ignored. Among these new workers a share S decides to invest in tertiary education. The model presents a simplified version of traditional models of human capital investments: First, education is instantaneous, second, investments in schooling only are considered (we omit post-schooling human capital investments such as on-the-job training, etc.[6]) and, third, investments in education are an all-or-nothing investment, implying that all individuals bearing the cost of this investment reach the same level of education and are therefore homogenous from the point of view of the employer. The assumption that education takes time often enables to emphasize the role of the skill premium, i.e. the shadow cost of education is lower when the skill premium is high. The reason for these radical assumptions is that the focus here is on the effect of *migration opportunities* on the education decision prior to the entrance on the labor market. The objective is not of having precise predictions with respect to individual earnings. The focus is on another aspect that distinguishes high-skilled jobs from low-skilled jobs: the migration cost associated with changing jobs. High-skilled jobs are assumed to be specialized so that moving to another

[5]This definition of skills goes in the same direction as Albrecht and Vroman (2002) or McKenna (1996). Others argue that high skilled have an absolute advantage in the performance of all tasks and a comparative advantage in the performance of complex tasks (Teulings (1995)).

[6]For a recent contribution proposing a model with investment in education (made by workers) and investment in training (made by firms) in a framework with matching frictions, see Brunello and Medio (2001). In their model, they show that, assuming that the United States are characterized by a larger matching efficiency and a larger separation rate, the proportion of firms investing in training is smaller. The reason is that firms prefer to hire trained workers directly and that the period to recoup a training investment is relatively short (consequence of a high separation rate).

high-skilled job involves paying a migration cost (in a broad sense).

A simplifying assumption is that workers need to choose the market on which they will apply[7]. Hence, high-skilled workers only apply to high-skilled tasks and low-skilled workers only apply to low-skilled jobs. The two markets interact with each other via the education decision. Then only, differences in market performances induce changes in the behavior of workers. Once they entered the labor market, there is no way back anymore, and workers evolve on one type of labor market only.

Firms and workers search for each other with a constant intensity. They meet at a rate determined by a matching function $m(u, v)$, where u is the number of unemployed searching for a job and v is the number of vacancies posted by the firms. One implication of this way of modelling is that the supply stimulates its own demand, as additional workers searching on a given market increase the profitability of posting a vacancy (since it is easier to find a match) and therefore stimulates vacancy posting[8]. Furthermore, the firm advertises for a particular job, i.e. for a particular task. The decision of the firm with respect to the type of task is irreversible. Workers cannot be reallocated to different tasks, once they have been hired. Firms on the low-skilled market will only advert for tasks that are in a good state. All low-skilled workers and all low-skilled vacant jobs form a pooled market from which matches will arise. On the high-skilled market, things may look different. If high-skilled workers do not find it profitable to migrate in order to chase the good job opportunities, there might be a market for "bad high-skilled tasks" in their region of origin. Some firms may find it profitable to compete for these non-emigrating workers and post vacancies on a market for the high-skilled task despite that it is in a

[7] Albrecht and Vroman (2002) and McKenna (1996) assume that high-skilled workers also apply to low-skilled jobs. With such an assumption, the incentives to invest in education therefore also depend on the performance on th low-skilled market. This is not assumed here because the focus is on the relative differences between the low-skilled and high-skilled markets.

[8] This may seem as a strong limitation, apparently not giving any role to technology determined demand (such as suggested in the literature on skill-biased technological change). However, the model does allow for this type of change, for example by playing on the parameter determining the productivity skill premium μ.

bad state. This point will get more attention in a later section. Finally, firms and workers have perfect information on their type (low-skilled or high-skilled worker, low-skilled task or high-skilled task).

Once a match occurs the firm and the worker observe the quality of their match given by x that corresponds to a random draw from a uniform distribution $f(x)$ defined on the interval $[0, 1]$. The demand for the tasks performed by high-skilled and low-skilled workers varies across space and time. In this model, the regional demand for a particular task is either good (g) or bad (b). The state of the world changes with probability λ. A booming state shifts the price of one unit of output by ε relatively to the stagnating state ($\varepsilon_g = \varepsilon$, $\varepsilon_b = 0$). The difference between a high-skilled and low-skilled worker is that the former needs to incur a migration cost to apply to an equivalent job as the one they have been fired from, while the latter can stay in his region.

Hence the general structure of the productivity of a match is the following:

$$y_{i,k,s} = p_{i,k,s}x + \varepsilon_s, \tag{4.1}$$

where i is the worker type (low-skilled, high-skilled), k is the job type (low-skilled, high-skilled) and s is the state of the world of the region.

$p_{i,k}$ is such that:

Worker Type $\longrightarrow$ Job type $\downarrow$	Low-skilled	High skilled
Low-skilled task	p	p
High-skilled task	0	σp

,

with $\sigma > 1$. Hence, high-skilled workers are assumed to have a comparative advantage on low-skilled workers regarding the performance of the high-skilled task. This is the only difference between low-skilled and high-skilled workers. This will determine different migration behaviors. Furthermore, it is assumed that $\sigma p > p + \varepsilon$, i.e. that a high-skilled job in a bad state is more productive than a low-skilled job. This implies that high-skilled workers never find it profitable to apply to low-skilled tasks and it is therefore possible to

completely isolate the two markets from each other. In the remaining of the Chapter, the subscript i is used to refer indifferently to the job type or worker type ($i = h$ (high-skilled), l (low-skilled)).

4.3.2 Bellman equations

Let us determine the values of searching and matching for each partner.

The value for a firm of forming a match of type j in the state of the world s, denoted by $J_{i,s}(x)$, is a function of the match-specific productivity x is determined as follows:

$$\begin{aligned} rJ_{i,s}(x) &= y_{i,s}(x) - w_{i,s}(y_{i,s}(x)) + \lambda \max[J_{i,t}(x), V - c_f] - (\lambda + n)J_{i,s}, \\ \text{with } s &\neq t, \end{aligned} \tag{4.2}$$

where w is the wage, V is the value of a vacancy and c_f is the firing cost. Once the match has occurred, the random productivity component x is revealed. Productivity changes then exogenously, i.e. depending on the regional demand for a given task. This means that at the beginning of the match, one can identify the matches that will survive negative aggregate shocks. An important assumption here is that the firm cannot reallocate the worker to other tasks, i.e. that there is some irreversibility in the decision to allocate the worker to a given task. Hence, when there is a negative shock (towards the region) the lowest productive matches will be destroyed. The firm then incurs a fixed firing cost c_f. This firing cost is not a severance payment, but simply a pure administrative cost. Finally, note that workers retire with probability n.

It is useful for the remaining of the Chapter to talk about *dying* and *surviving* jobs. There are defined as follows:

A job with random productivity $\overline{x}$ is dying if and only if:

$$J_{i,b}(\overline{x}) < V - c_f, \tag{4.3}$$

A job with random productivity $\overline{x}$ is called surviving if and only if:

$$J_{i,b}(\overline{x}) \geq V - c_f, \tag{4.4}$$

We will use the superscript d and s respectively for dying and surviving jobs.

On the worker's side, one has:

$$\begin{aligned} rW_{i,s}(x) &= w_{i,s}(y_{i,s}(x)) + \lambda \max[W_{i,t}(x), \overline{U}_{i,t}] - (\lambda + n)W_{i,s}, \\ \text{with } s &\neq t, \end{aligned} \tag{4.5}$$

where $\overline{U}_{i,t}$ is the value of *being unemployed* in a region in the state of the world t. $\overline{U}_{i,t} = \max[U_{i,t}, U_{i,s} - c_m]$, i.e. unemployed workers can choose where to actively *search* for a job. The assumption is that they have to incur the migration cost beforehand.

There is free entry of vacancies. Hence, vacancies are posted until their value is equal to 0:

$$\frac{c_r}{q(\theta_{i,s})} = E(J_{i,s}(x)), \tag{4.6}$$

This implies that more vacancies are posted on the most profitable market, i.e. with the highest expected value of matching.

Let us now analyze the searching decision of the worker. The value of searching is, for a low-skilled worker, defined as follows:

$$rU_{l,g} = b + m(\theta_{l,g})E(W_{l,g}(x) - U_{l,g}) - nU_{l,g}, \tag{4.7}$$

where b is the value of leisure.

The value of searching for a job is, for a high-skilled worker, described as follows:

$$rU_{h,b} = b + m(\theta_{h,b})E(W_{h,b}(x) - U_{h,b}) + \lambda(\overline{U}_{h,g} - U_{h,b}) - nU_{h,b}, \tag{4.8}$$

$$rU_{h,g} = b + m(\theta_{h,g})E(W_{h,g}(x) - U_{h,g}) + \lambda(\overline{U}_{h,b} - U_{h,g}) - nU_{h,g}, \tag{4.9}$$

With a probability λ the state of the world changes and the unemployed worker faces a similar choice as the one he has when he is being fired.

4.3.3 Wage bargaining

Wages are bargained through a Nash bargaining process.

In low-skilled jobs, the equilibrium wages are simply:

$$w^*_{l,s}(y_{l,s}(x)) = \beta(y_{l,s}(x) + (r+n)c_f) + (1-\beta)(r+n)\overline{U}_{l,s}, \tag{4.10}$$

In high-skilled jobs, the equilibrium wages are:

$$w^*_{h,s}(y_{h,s}(x)) = \beta(y_{h,s}(x) + (r+n)c_f) + (1-\beta)((r+n)\overline{U}_{h,s} + \lambda(\overline{U}_{h,s} - \overline{U}_{h,t})), \tag{4.11}$$

There are two differences between the wage on the low-skilled market and on the high-skilled market. For a given worker type, state of the world and random productivity x, first, the productivity leads to higher wages on the high-skilled market and, second, the workers on the high-skilled market benefit from a regional insider power or weakness depending on the sign of $(\overline{U}_{h,s} - \overline{U}_{h,t})$. Finally, note that, at equal productivity levels, high-skilled workers earn relatively more in low-skilled jobs than low-skilled workers. Indeed, as the next paragraph will show, high-skilled workers benefit from a better outside option.

4.3.4 Search and migration decision

Migrating to the neighboring region implies bearing a migration cost c_m. Low-skilled workers never have an incentive to migrate since they can always apply to good low-skilled jobs. High-skilled workers on the other hand migrate to the neighboring region if and only if:

$$U_{h,g} - c_m \geq U_{h,b}, \tag{4.12}$$

One should realize here that if one high-skilled worker find it profitable to migrate, all high-skilled workers of the same type also do. The reason is that the migration cost does not depend on the population migrating, neither the cost of posting a vacancy. Hence, job creation on the vacancy market implies that the respective values of searching for a job in a region where the task is in a good state and in a bad state do not depend on the migration flow. Let us denote by c^*_m the migration cost at which the high-skilled workers are indifferent between migrating and not migrating:

$$c^*_m = [U_{h,g}]^z - [U_{h,b}]^z, \tag{4.13}$$

where $[U_{h,s}]^z$ denotes the value of searching for a job in a region where the demand for the high-skilled task is in state s and such that no migration has taken place yet.

Finally, new workers are supposed to enter the market on the good side.

This implies, with Nash bargaining:

$$U_{l,g} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{l,g} + c_f(1 - F(\underline{x}_{l,g}))m(\theta_{l,g})\right)}{r+n}, \tag{4.14}$$

On the high-skilled market, in the zero migration equilibrium (where no one finds it profitable to migrate):

$$U_{h,b} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{h,b} + c_f(1 - F(\underline{x}_{h,b}))m(\theta_{h,b})\right) + \lambda(U_{h,g} - U_{h,b})}{r+n}, \tag{4.15}$$

$$U_{h,g} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{h,g} + c_f(1 - F(\underline{x}_{h,g}))m(\theta_{h,g})\right) + \lambda(U_{h,b} - U_{h,g})}{r+n}, \tag{4.16}$$

On the high-skilled market, in the full migration equilibrium (where all unemployed high-skilled workers find it profitable to migrate to the region where the demand for the high-skilled task is in a good state):

$$U_{h,b} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{h,b} + c_f(1 - F(\underline{x}_{h,b}))m(\theta_{h,b})\right) + \lambda c_m}{r+n}, \tag{4.17}$$

$$U_{h,g} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{h,g} + c_f(1 - F(\underline{x}_{h,g}))m(\theta_{h,g})\right) - \lambda c_m}{r+n}, \tag{4.18}$$

4.3.5 Hiring and firing thresholds

Similarly the values at which the firm and the worker start to find it worthwhile to produce together can be determined. Remember that if high-skilled workers find it profitable to migrate ($c_m < c_m^*$) then there are no vacancies posted for tasks for which the demand is in a bad state. This is a consequence of the migration and job creation conditions. The worker is hired if the surplus of the firm is positive. Once an employment relationship is established, separation is costly. The firm indeed needs to incur a fixed firing cost c_f at separation (exogenous or endogenous).

Hiring productivity floor

The hiring productivity floor is the minimum productivity level at which the firm finds it profitable to hire the worker. Hence, for $c_m < c_m^*$: Then, the productivity threshold is defined as follows:

$$\underline{x}_{i,s} = \min[\underline{x}^d_{i,s}, \underline{x}^s_{i,s}], \tag{4.19}$$

where $\underline{x}^d_{i,s}$ is such that $J^d_{i,s}(\underline{x}^d_{i,s}) = 0$,and $\underline{x}^s_{i,s}$ is such that $J^s_{i,s}(\underline{x}^s_{i,s}) = 0$,

which leads to the following productivity floors:

On the low-skilled market:

$$p\underline{x}^d_{l,g} = -\varepsilon + (r+n)U_{l,g} + \frac{\beta(r+n)c_f + \lambda c_f}{1-\beta}, \tag{4.20}$$

$$p\underline{x}^s_{l,g} = -\frac{r+\lambda+n}{r+2\lambda+n}\varepsilon + (r+n)U_{l,g} + \frac{\beta(r+n)c_f}{1-\beta}, \tag{4.21}$$

On the high-skilled market:

$$\sigma p\underline{x}^d_{h,g} = -\varepsilon + (r+n)U_{h,g} + \lambda(U_{h,g} - \overline{U}_{h,b}) + \frac{\beta(r+n)c_f + \lambda c_f}{1-\beta}, \tag{4.22}$$

$$\sigma p\underline{x}^s_{h,g} = -\frac{r+\lambda+n}{r+2\lambda+n}\varepsilon + (r+n)U_{h,g} + \frac{\beta(r+n)c_f}{1-\beta}, \tag{4.23}$$

And if high-skilled workers do not find it profitable to migrate, vacancies are posted for bad high-skilled tasks as well and the corresponding hiring productivity floor is:

$$\sigma p\underline{x}_{h,b} = -\frac{\lambda}{r+2\lambda+n}\varepsilon + (r+n)U_{h,b} + \frac{\beta(r+n)c_f}{1-\beta}, \tag{4.24}$$

The firing cost c_f pushes in all cases the hiring thresholds up.

Firing thresholds

Let us now determine the firing threshold, i.e. the point where the firm and the worker are indifferent between separating and continuing together.

$$\widetilde{x}_i = \max[\underline{x}_{i,g}, \widetilde{x}^d_i] \tag{4.25}$$

where $\widetilde{x}_i^d$ is such that $J_{i,b}(\widetilde{x}_i) = -c_f$.

On the low-skilled market:

$$p\widetilde{x}_l^d = (r+n)\overline{U}_{l,b} - \frac{\lambda}{r+2\lambda+n}\varepsilon - (r+n)c_f, \tag{4.26}$$

On the high-skilled market:

$$\sigma p\widetilde{x}_h^d = -\frac{\lambda}{r+2\lambda+n}\varepsilon + (r+n)\overline{U}_{h,b} - (r+n)c_f \tag{4.27}$$

The firing cost pushes all firing thresholds down, reducing thereby job destruction.

Equations determining the job creation condition ([4.6]), the values of searching ([4.14], [4.15], [4.16], [4.17] and [4.18]) and the hiring and firing thresholds ([4.19] and [4.25]) form a system which by being solved give the equilibrium values $\theta_{i,s}^*, \underline{x}_{i,s}^*, \widetilde{x}_i^*$ and $U_{i,s}^*$.

4.3.6 Education decision

Now let us turn to the education decision. Education here is an all-or-nothing investment. Individuals having acquired education are then identical when they enter the labor market. At each period, n new workers take the decision, right before entering the labor force, to invest in education or not. Education does not take time and is instantaneously acquired at a cost that is individual specific. Individuals are distributed uniformly on a scale of costs of education defined on the interval $[0, 1]$, with the least able people being the ones with the highest costs of acquiring education.

New high-skilled workers enter the labor market on the good side, i.e. start searching for a job in the region where the high-skilled task is in a good state. Hence, there is a threshold cost level $\widetilde{c}$ under which workers find it profitable to invest in education:

$$U_{s,g}^* - \widetilde{c}^* = U_{u,g}^*, \tag{4.28}$$

$$\widetilde{c}^* = U_{h,g}^* - U_{l,g}^*, \tag{4.29}$$

Given that workers are uniformly distributed on the education cost scale defined on $[0, 1]$, $\widetilde{c}$ corresponds to the share of workers investing in education.

Proposition 4.1 *For $c_m < c_m^*$: Investments in education decrease with the migration cost (Proof in the Appendix)*

To show this, it is useful to picture the equilibrium on each labor market separately by two curves: the job creation curve and the search curve (see Figure 4.1), which are defined respectively by the following equilibrium conditions:

On the low-skilled market:

$$\frac{c_r}{q(\theta_{l,g})} = \int_{\underline{x}_{l,g}}^{\widetilde{x}_l} J_{l,g}^d(x)dF(x) + \int_{\widetilde{x}_l}^{1} J_{l,g}^s(x)dF(x) \tag{4.30}$$

$$U_{l,g} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{l,g} + c_f(1 - F(\underline{x}_{l,g}))m(\theta_{l,g})\right)}{r+n}, \tag{4.31}$$

given $\underline{x}_{l,g}^d$ and $\widetilde{x}_l$ (as determined by equations [4.19] and [4.25]).

On the high-skilled market (in the case where migration is profitable)

$$\frac{c_r}{q(\theta_{h,g})} = \int_{\underline{x}_{h,g}}^{\widetilde{x}_h} J_{h,g}^d(x)dF(x) + \int_{\widetilde{x}_h}^{1} J_{h,g}^s(x)dF(x) \tag{4.32}$$

$$U_{h,g} = \frac{b + \frac{\beta}{1-\beta}\left(c_r\theta_{h,g} + c_f(1 - F(\underline{x}_{h,g}))m(\theta_{h,g})\right) - \lambda c_m}{r+n}, \tag{4.33}$$

Given that $\underline{x}_{h,g}^d$ and $\widetilde{x}_h$ (as determined by equations [4.19] and [4.25]).

Following an increase in the migration cost, nothing changes on the low-skilled market. On the high-skilled market, both curves shift downwards. On the job creation side, an increase in the migration cost has a negative effect on the value of filling a vacancy with a dying job. Indeed, for these jobs, it holds that the migration cost provides them with a regional insider power that never turns into a regional insider weakness as these jobs are by definition destroyed in bad times. On the search side, an increase in the migration cost has a negative effect on the value of being unemployed only if employment protection exists. In that case, the migration cost reduces the probability of being hired and therefore of benefitting from the worker insider gain.

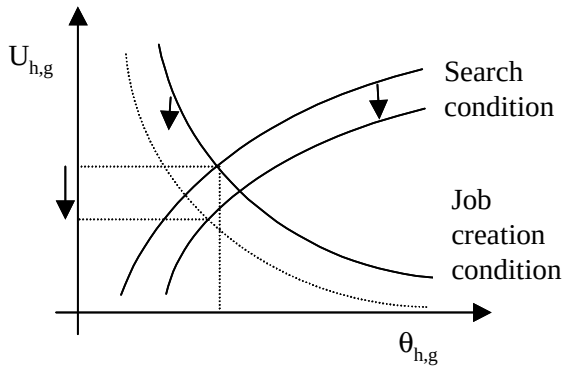

Figure 4.1: Job and search conditions on the high-skilled market

This means that the equilibrium value of being unemployed on the high-skilled market unambiguously falls while the value of being unemployed on the low-skilled market remains unchanged. This implies that investments in education are reduced.

Proposition 4.2 *For $c_m < c_m^*$: The presence of a firing cost can reduce the negative effect of migration on the investments in education*

A change in the migration cost has no effect on the low-skilled market. On the high-skilled market on the other hand, it pushes both curves downwards. On the job creation side, employment protection reduces the size of the shift as it reduces the share of dying jobs which are hit by an increase in the migration cost. Hence, the presence of a firing cost reduces the negative effect of the migration cost on job creation. On the search side, employment protection increases the losses associated with not matching, i.e. increases the negative effect of the migration cost on the value of being unemployed.

4.3.7 Equilibrium

The previous sections derived the equilibrium values $\theta_{i,s}^*, \underline{x}_{i,s}^*, \widetilde{x}_i^*$ and $U_{i,s}^*$.

Let us now characterize the evolution of labor market stocks over time. $u(t)$ is defined as $u(t) = u_l(t) + u_h(t)$, $u_l\,(t)$ being the unemployment at time t on the low-skilled market

and $u_h(t)$ the unemployment at time t on the high-skilled market. These can be subdivided according to the state of the jobs to which the unemployed workers are applying to: $u_l(t) = u_{l,b}(t) + u_{l,g}(t)$ for bad and good state respectively, and similarly, $u_h(t) = u_{h,b}(t) + u_{h,g}(t)$. On the low-skilled market only jobs with tasks that are in the good state are offered: $u_l(t) = u_{l,g}(t)$, and $u_{l,b}(t) = 0$. When high-skilled find it profitable to migrate across regions, $u_h(t) = u_{h,g}(t)$, and $u_{h,b}(t) = 0$. When they do not: $u_h(t) = u_{h,g}(t) + u_{h,b}(t)$. Total employment at time t is denoted by $l(t)$. $l_l(t)$ is the employment of low-skilled workers at time t, $l_h(t)$ is the employment of high-skilled workers at time t. Both can be subdivided into the employment in tasks that are in a good and bad state of the world: $l_h(t) = l_{h,g}(t) + l_{h,b}(t)$, $l_l(t) = l_{l,g}(t) + l_{l,b}(t)$.

First, the labor force is constant, such that the flows into and out of the labor force are equal:

$$nu(t) + nl(t) = n(t), \tag{4.34}$$

given that

$$\begin{aligned} u(t) + l(t) &= 1, && (4.35)\\ u(t) &= u_h(t) + u_l(t), && (4.36)\\ l(t) &= l_h(t) + l_l(t), && (4.37) \end{aligned}$$

In the long run, the shares of low-skilled and high-skilled markets are fully determined by $\widetilde{c}^*$:

$$\begin{aligned} l_h(t) + u_h(t) &= \widetilde{c}^*, && (4.38)\\ l_l(t) + u_l(t) &= 1 - \widetilde{c}^*, && (4.39) \end{aligned}$$

On the low-skilled market, there is an infinite number of low-skilled tasks which are either in a good or in a bad state. Newly formed matches are allocated to good tasks. Therefore the equilibrium is such that the flows into unemployment equal the flows out

of unemployment (and $u_l(t) = u_l^*$):

$$n(1-\widetilde{c}^*) + \lambda(1-n)l_{l,g}^{d*} = nu_{l,g}^* + m(\theta_{l,g}^*)(1-F(\underline{x}_l^*))u_{l,g}^*(1-n), \tag{4.40}$$

where $l_{l,g}^{d*}$ is the equilibrium employment in dying jobs. The left-hand side is the total unemployment inflow. It is composed of the new workers entering the labor market and the proportion of living workers employed in a dying job and hit by a negative shock. On the right-hand side, one finds the unemployment outflow. A proportion n unemployed workers die and among the surviving unemployed workers, a proportion $m(\theta_{l,g}^*)(1-F(\underline{x}_l^*))$ finds a suitable match.

Furthermore, the respective shares of dying and surviving jobs should also be constant over time. Therefore, one has:

$$m(\theta_{l,g}^*)(F(\widetilde{x}_l) - F(\underline{x}_l^*))u_{l,g}^*(1-n) = \lambda(1-n)l_{l,g}^{d*} + nl_g^{d*}, \tag{4.41}$$

and the complement:

$$m(\theta_{l,g}^*)(1-F(\widetilde{x}_l^*))u_{l,g}(1-n) = nl_g^{s*}, \tag{4.42}$$

where $l_{l,g}^{s*}$ is the employment in surviving jobs.

Let us now turn to the high-skilled market. When migration is profitable, the following happens. High-skilled unemployed workers migrate to the region in which the high-skilled task is in a good state. The region switches to a bad state with a probability λ. All the dying jobs are destroyed as soon as the shock arise and the unemployed workers migrate to the neighboring region where new matches are progressively formed.

In the full migration equilibrium, all unemployed high-skilled workers are searching for a job in the good region. The expected evolution of the aggregate unemployment rate is therefore:

$$E_t[\dot{u}_h(t)] = -u_h(t)(1-n)m(\theta_{h,g}^*(t))(1-F(\underline{x}_g^*)) + \lambda(1-n)l_h^d(t), \tag{4.43}$$

where $\dot{u}(t)$ is the evolution of unemployment rate at time t, $l_h^s(t) = l_{h,g}^s(t) + l_{h,b}^s(t)$ is the total employment in surviving jobs (sum of the surviving employment in a bad and in a good region) and $l_h^d(t)$ is the dying employment at time t. The evolution of the aggregate dying employment rate has the following expectation:

$$E_t[\dot{l}_h^d(t)] = u_h(t)(1-n)m(\theta_g^*(t))(F(\widetilde{x}_h^*) - F(\underline{x}_{h,g}^*)) - (\lambda + n - n\lambda)l_h^d(t), \tag{4.44}$$

The evolution of the aggregate surviving employment rate (good and bad regions) has the following expectation:

$$E_t[\dot{l}_{h,g}^s(t)] = u_h(t)(1-n)m(\theta_{h,g}^*(t))(1 - F(\widetilde{x}_h^*)) - nl_h^s(t), \tag{4.45}$$

The total labor force remains constant over time, which implies:

$$u_h(t) + l_h^s(t) + l_{h,g}^d(t) = \widetilde{c}^*, \tag{4.46}$$

In the zero migration equilibrium high-skilled unemployed workers remain in their region, even if it is in a bad state. This means that firms create vacancies also in this region. Let us denote by $u_h(t,w)$ the regional unemployment rate of a region that is in the state of the world w at time t. The evolution of the regional unemployment rate has therefore the following expectation:

$$\begin{aligned} E_t[\dot{u}_h(t,g)] \;=\; & -(1-\lambda)\left[(1-n)u_h(t,g)m(\theta_{h,g}^*(t))(1 - F(\underline{x}_{h,g}^*) + n\widetilde{c}^*\right] \\ & -\lambda(1-n)u_h(t,g)m(\theta_{h,b}^*(t))(1 - F(\underline{x}_{h,b}^*)) \\ & +\lambda(1-n)l_{h,g}^d(t), \end{aligned} \tag{4.47}$$

$$\begin{aligned} E_t[\dot{u}_h(t,b)] \;=\; & -(1-\lambda)(1-n)u_h(t,b)m(\theta_{h,b}^*(t))(1 - F(\underline{x}_{h,b}^*)) \\ & -\lambda\left[(1-n)u_h(t,b)m(\theta_{h,g}^*(t))(1 - F(\underline{x}_{h,g}^*) + n\widetilde{c}^*\right]), \end{aligned} \tag{4.48}$$

The evolution of the dying high-skilled employment rate has the same expectation as in the full migration equilibrium, except that the unemployment pool is reduced to the

number of unemployed present in the region that is in a good state, so that the high-skilled unemployment rate in the expression must be replaced by $u_h(t,g)$.

Let us denote by $l_h^{R,s}(t,w)$ the regional high-skilled employment rate in surviving jobs in a region that is in state w at time t. The evolution of the surviving regional high-skilled employment rate has the following expectation:

$$\begin{aligned} E_t[\dot{l}_h^{R,s}(t,g)] &= (1-\lambda)(1-n)u(t,g)m(\theta_g^*(t))(1-F(\widetilde{x}^*)) \\ &\quad +\lambda(1-n)u(t,g)m(\theta_b^*(t))(1-F(\underline{x}_b^*)) - nl^{R,s}(t,g), \qquad (4.49) \\ E_t[\dot{l}_h^{R,s}(t,b)] &= (1-\lambda)(1-n)u(t,b)m(\theta_b^*(t))(1-F(\underline{x}_b^*)) \\ &\quad +\lambda(1-n)u(t,b)m(\theta_g^*(t))(1-F(\widetilde{x}^*)) - nl^{R,s}(t,b), \qquad (4.50) \end{aligned}$$

An important property of these variables is that they are stationary. This means that there exists a unique set $\{u_h(t), l_h^s(t), l_h^d(t)\}$ such that $E_t[\dot{u}_h(t)] = E_t[\dot{l}_h^d(t)] = E_t[\dot{l}_{h,g}^s(t)] = 0$ such that (where $\overline{y}$ is the stationary value of y):

In the full migration equilibrium:

$$\begin{aligned} \overline{l}_h^d &= \frac{m(\theta_{h,g}^*(t))(F(\widetilde{x}^*) - F(\underline{x}_g))}{\lambda + n - \lambda n}\overline{u}_h(1-n), \qquad (4.51) \\ \overline{l}_h^s &= \frac{m(\theta_{h,g}^*(t))(1-F(\widetilde{x}_h^*))}{n}\overline{u}_h(1-n), \qquad (4.52) \\ \overline{l}_h^d + \overline{l}_h^s + \overline{u}_h &= \widetilde{c}^*, \qquad (4.53) \end{aligned}$$

and in the zero migration equilibrium:

$$\begin{aligned} \overline{l}_h^d &= \frac{(1-\lambda)\overline{u}_h(t,g) + \lambda\overline{u}_h(t,b)}{\lambda + n - \lambda n}m(\theta_{h,g}^*(t))(F(\widetilde{x}^*) - F(\underline{x}_g^*)), \qquad (4.54) \\ \overline{l}_{h,g}^{R,s} &= \frac{(1-\lambda)m(\theta_{h,g}^*(t))(1-F(\widetilde{x}_h^*)) + \lambda m(\theta_{h,b}^*(t))(1-F(\underline{x}_{h,b}^*))}{n}\overline{u}_{h,g}(1-n), \\ &\qquad (4.55) \\ \overline{l}_{h,b}^{R,s} &= \frac{(1-\lambda)m(\theta_{h,b}^*(t))(1-F(\underline{x}_{h,b}^*)) + \lambda m(\theta_{h,g}^*(t))(1-F(\widetilde{x}_h^*))}{n}\overline{u}_{h,b}(1-n), \\ &\qquad (4.56) \\ \overline{l}_{h,g}^{R,s} + \overline{u}_{h,g} + \overline{l}_h^d &= \frac{1}{2}\widetilde{c}^*, \qquad (4.57) \\ \overline{l}_{h,b}^{R,s} + \overline{u}_{h,b} &= \frac{1}{2}\widetilde{c}^*, \qquad (4.58) \end{aligned}$$

Parameter	Value
Probability of dying n	0.012
Discount rate r	0.05
Probability of regional transition λ	0.1
Productivity differential ε	1
Skill premium σ	1.1
Worker's bargaining power β	0.5
Productivity p	1
Recruitment cost c_r	0.1
Matching efficiency a	1
Matching elasticity α	0.5
Unemployment benefit b	0.05
Migration cost c_m	[0,1]
Employment protection c_f	[0,1]
Subsidy to tertiary education s	[0,1]

Table 4.2: Parameter values

with $\overline{l}_h^s = \overline{l}_{h,g}^{R,s} + \overline{l}_{h,b}^{R,s}$ and $\overline{u}_h = \overline{u}_{h,g} + \overline{u}_{h,b}$.

4.4 Numerical example

To illustrate the argument, here is a simple numerical example. The parameters chosen are the presented in Table 4.2.

To give a rough idea of what these parameters mean, one could translate the model into a discrete time equivalent where one period of time is a year. The probability of dying corresponds to a life expectancy of around 75 years old, which is roughly what is observed in the developed world (averaging women and men). The discount rate corresponds to a yearly interest rate of 5%. There is some freedom regarding the parameter λ as nothing in this model suggests that it should picture structural or cyclical changes. The same holds for the productivity differential. The value chosen here is $\varepsilon = 1$, that implies that the productivity differential is equal to half of the maximum productivity a low-

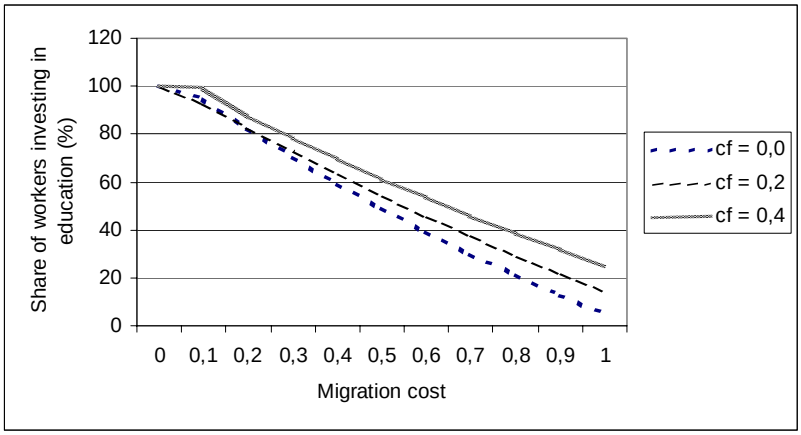

Figure 4.2: Investments in education and migration costs

skilled match could have in a good region. The skill premium is set to 1.1. This may seem quite small. But one should remind that the ambition of this model is to capture the mechanisms underlying investments in tertiary education, relative to lower levels of education. Therefore, the difference in productivity is not expected to be too large. Finally, note that the migration cost and the firing cost vary between 0 and 1.

The next section considers the effects of migration costs and employment protection on the investments in education and welfare. It looks at equilibrium values associated with various parameter configurations and does not consider the transition effects of parameter changes.

4.4.1 Migration costs and investments in education

Let us first consider the effect of a change in the migration costs on the investments in human capital. Given that they have a negative effect on the value of being unemployed on the high-skilled market, these investments decrease with the migration cost. However, the theory mentions a potential role for the firing cost that, by reducing the share of dying jobs, reduces the negative effect of the migration cost on job creation.

Figure 4.2 shows that as the migration cost increases, the percentage of people invest-

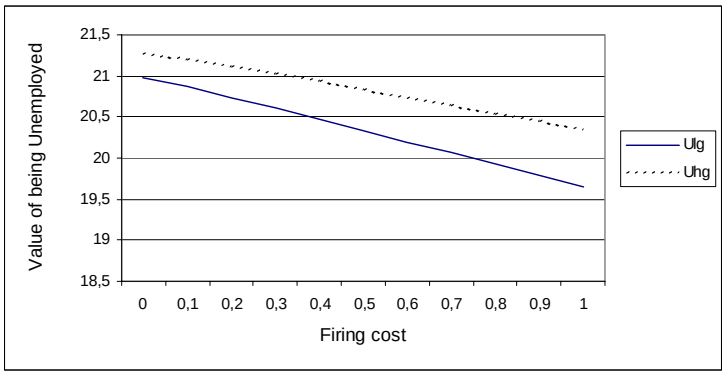

Figure 4.3: Value of being unemployed and firing cost

ing in tertiary education decreases. But the higher the firing cost, the lower this effect. Employment protection deteriorates the value of being unemployed for all workers, but relatively more for low-skilled workers than high-skilled workers. The explanation for that is the existence of the migration cost. The migration cost reduces the share of dying jobs on the high-skilled market relatively to the low-skilled market and therefore reduces the share of jobs that are particularly hit by employment protection.

Figure 4.3 shows the evolution of the equilibrium value of being unemployed on each market (in good times), for a migration cost fixed at 0.7 that gives a share of educated workers that correspond more or less to the share of tertiary educated in the developed world. The firing cost reduces both values but has a larger negative effect on the high-skilled unemployed workers than on the low-skilled ones. This implies that employment protection indeed stimulates investments in human capital.

4.4.2 Welfare effects of employment protection

Now let us turn to the welfare effects of employment protection in the presence of a migration cost $c_m = 0.7$. For that purpose, one should have an idea of the distribution of workers across job types and regions. The equilibrium values of employment and unemployment can be calculated for the low-skilled market. For the high-skilled market,

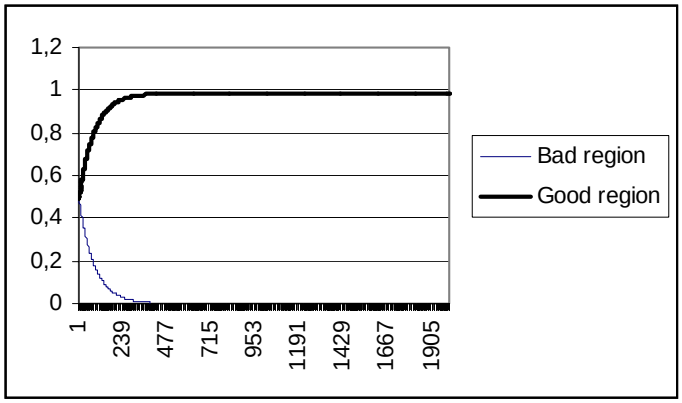

Figure 4.4: Regional high-skilled employment rates in best and worse scenari

one can compute the stationary values of employment and unemployment and simulate the economy to have a rough idea of how large the fluctuations can be around these stationary values. This is what this section does.

A first exercise simulates the economy with a firing cost equal to 0. On the low-skilled market, the equilibrium values of unemployment and employment are calculated, in each job type. On the high-skilled market, a first simulation is for a benchmark case, showing what would happen if the state of the world would never change. Not surprisingly all the employment and unemployment would be concentrated in the good region. The national unemployment rate converges to 1.5% and the employment rate to 98.5% from with 40.3% in dying jobs and 59.7 % in surviving jobs The employment rates of the two regions should therefore evolve between 0 and these upper limits. This is illustrated in Figure 4.4.

The next step is to simulate using the Markovian transition matrix. The results of the simulations for the employment rates are presented in Figure 4.5.

Important for the calculation of welfare is to have an estimate of how high-skilled workers are distributed across tasks. Figures 4.6, 4.7 and 4.8 show the simulated evolution of the employment rates in dying tasks, surviving tasks and bad tasks in total (adding the regions up):

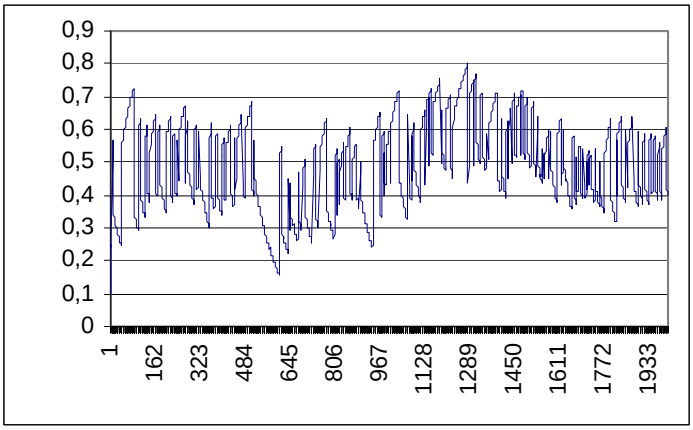

Figure 4.5: Evolution of regional high-skilled employment rates

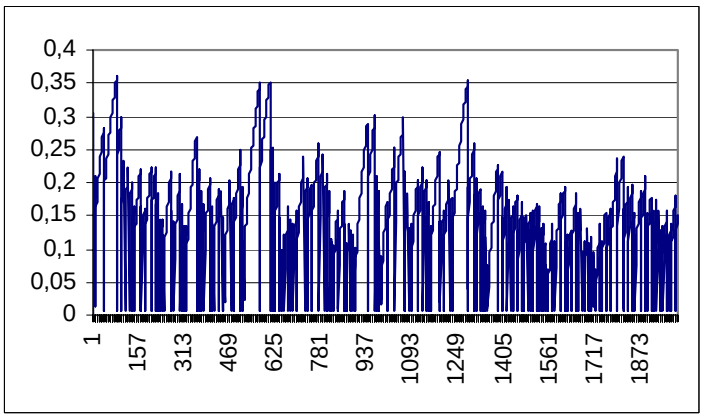

Figure 4.6: Evolution of total employment rate in dying high-skilled tasks

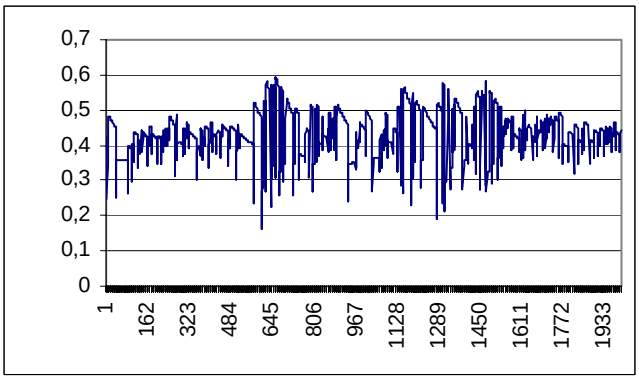

Figure 4.7: Evolution of employment rates in surviving good high-skilled tasks

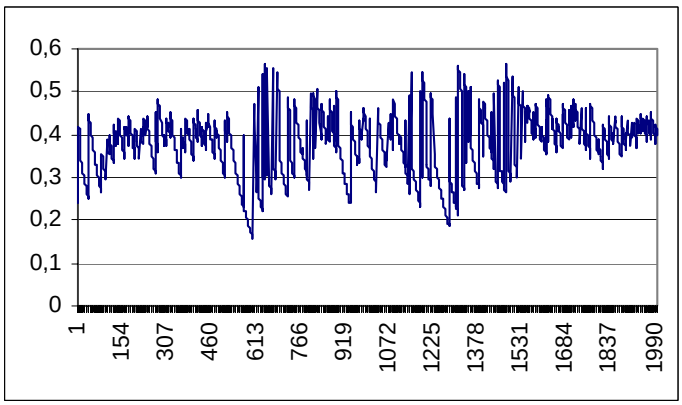

Figure 4.8: Evolution of employment rates in bad high-skilled tasks

	Stationary values (high-skilled)	Equilibrium values (low-skilled)
Total employment rate (%)	96.7	95.5
Share dying (%)	15.3	28.1
Share surviving (good+bad) (%)	84.6	68.7
Unemployment rate (%)	3.2	4.5
Market share (%)	40.3	59.7

Table 4.3: Employment and unemployment rates without EPL

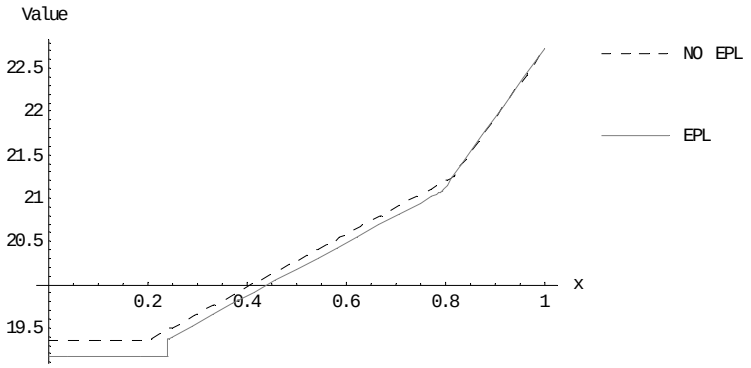

Figure 4.9: Values of being unemployed and employed in good tasks - Low-skilled market

Table 4.3 presents the steady-state values for the low-skilled market and stationary values for the high-skilled market of the employment rates. We see that the average proportion of workers in dying tasks is much larger for low-skilled workers than high-skilled ones.

We now analyze what happens when introducing a firing cost ($c_f = 0.2$). Let us look at what happens to the values of being unemployed and employed as a function of the productivity level (which determine the individual welfare). Figures 4.9, 4.10, 4.11 and 4.12 represent them. On the low-skilled market, only the most productive workers (in surviving good tasks) would be better off with employment protection. On the high-skilled market, workers in surviving jobs (bad or good) prefer employment protection.

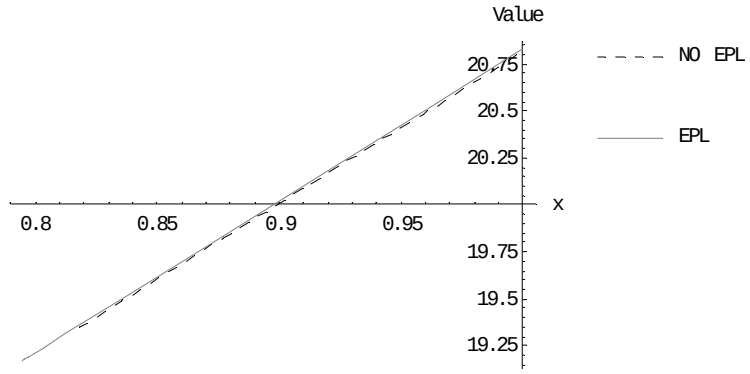

Figure 4.10: Values of being employed and unemployed in bad tasks - Low-skilled market

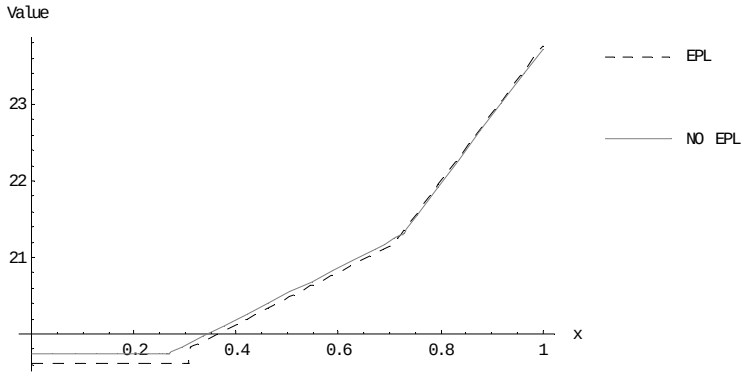

Figure 4.11: Values of being employed and unemployed in good tasks - High-skilled market

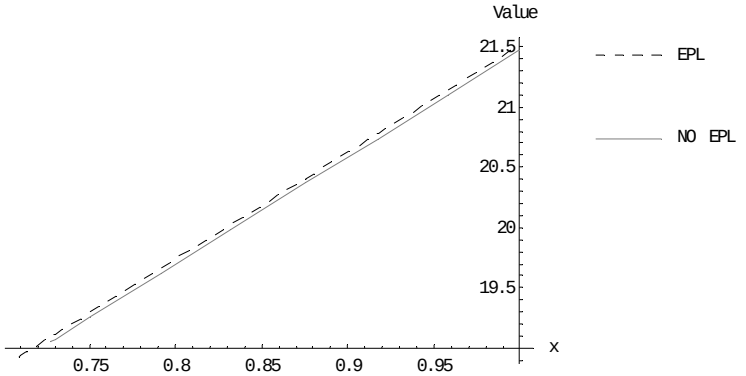

Figure 4.12: Values of being employed and unemployed in bad tasks - High-skilled market

The second implication is that the market share of high-skilled workers increases as now 45.2% of the population find it profitable to invest in education.

This means that the vast majority of high-skilled workers would be better off in a system with EPL, while low-skilled workers would be better off without EPL. For illustrative matters, the change in total welfare (measured in the utilitarian way) is calculated on the basis of the simulation results. The results are reported in Table 4.4. It suggests that even if low-skilled workers are worse off, the positive effect on the high-skilled workers (including the effect on the proportion of workers choosing to invest in education) dominates the negative effect on the low-skilled workers. However, given that high-skilled workers are in minority in the population, such a reform might not be politically feasible. It is therefore tempting to implement an asymmetric employment protection system, where high-skilled workers would be protected and low-skilled workers would not. Suppose that employment protection is positive for high-skilled workers and equal to 0 for low-skilled ones. What happens then is that, comparing with a situation with no firing costs, the investments in tertiary education decrease. In this example, the share of people investing in tertiary education falls to 72.0%.

What happens to welfare? The welfare of low-skilled workers with the new market share is equal to 0.70 and the total welfare of high-skilled workers becomes 0.63. The drop in total high-skilled welfare is due to the fall in their market share. This type of reform would however be politically feasible as the majority of high-skilled workers and low-skilled workers would be in its favour.

To prevent welfare from falling so much, other policies could be considered such as a subsidy to tertiary education and a subsidy to migration. A complete welfare analysis is beyond the scope of this Chapter, as one should probably introduce external effects of investments in education (such as complementarity between low-skilled and high-skilled workers, or the unemployment income as a function of the average wage). A subsidy to tertiary education would, in this simple framework, where workers are uniformly distrib-

	$c_f = 0$	$c_f = 0.2$
(1) Low-Skilled workers	0.97	0.92
(1b) Welfare LS * market share	0.58	0.50
(2) High-skilled workers	1.66	2.10
(2b) Welfare HS * market share	0.67	0.95
Total Welfare (1b+2b)	1.25	1.45

Table 4.4: Welfare

uted with respect to the cost of acquiring education, imply an upward parallel shift of the distribution of workers investing in education. The basic difference with employment protection legislation being that the value of being unemployed does not decrease. Of course, this subsidy to education should be financed, for example by taxes levied on labor. In this framework, introducing a lump-sum tax levied on all the workers would stimulate investments in education without deteriorating labor market performance. However again this framework is too simple to consider the overall welfare gains.

Finally, a subsidy to migration could also be a potential candidate for stimulating investments in tertiary education. The effect of such a policy can be read directly from Figure 4.2.

4.5 Discussion

The results derived in this Chapter rely on the assumption that the migration needs of high-skilled and low-skilled workers may be different, due to the fact that high-skilled workers are more specialist than low-skilled workers. The focus was therefore on shocks that are task-specific. Of course, the real world is much more complex than that and, in particular, it could be that a whole region falls into a slump, meaning that there are no good jobs available anymore in that region, even for low-skilled workers. In that case, the migration cost is relevant for both activities and it is therefore not so clear what would happen to the investments in tertiary education if this migration cost would happen to

be high. In this Chapter, the focus is rather on the consequences of this migration cost on the situation of high-skilled workers relative to low-skilled ones.

However it is interesting to realize that in such a situation, the recommendations in terms of employment protection legislation might be different than the ones proposed here. Especially if one considers the possibility of higher migration costs among the lower skilled workers. This situation is investigated in Chapter 3. It is shown that countries with large migration costs (or low-skilled workers in this particular case) are more likely to support employment protection than countries with low migration costs. The essence of the result is the same as in this Chapter: The people who need to incur costs in order to find good jobs are more likely to support safe jobs, large unemployment spells, and large insider gains that the people who can move easily between good job opportunities. If low-skilled workers face higher migration costs (relatively to their income or in absolute terms (they do not speak a foreign language, etc.)), it would maybe be welfare improving to implement employment protection for low-skilled workers. However, it is hard to be convinced by this inequality in migration costs. Even if it is observed in the facts that high-skilled workers maybe have less difficulties with adapting to new environments (because they for example speak the language of destination), it is hard to believe that at birth, talented people have lower migration costs than untalented ones. It could be that investing in education reduces the migration cost but since education is costly, at the end of the day, all workers face a cost that is more or less equivalent. Furthermore, the type of migration considered here is between regions, and therefore the migration cost represents the psychological cost of moving, the cost of selling and buying a new house, which are not very clearly skill specific.

4.6 Conclusion

This Chapter analyzes the interactions between geographical labor mobility, employment protection and investments in education. It shows that if investing in education means acquiring specialized human capital for which the demand fluctuates across time and space, obstacles to geographical labor mobility will discourage this type of investments.

However several policies can be thought of so as to stimulate investments in human capital. One of the candidate is employment protection. The reasoning is the following. The migration cost is a bad thing for firms employing high-skilled workers as they provide them with a "regional insider power". However, in jobs that alternate good and bad times this regional insider gain is compensated for by a regional insider weakness as soon as there are bad times. This is not true for jobs that exist only in good times and are destroyed in bad times. Therefore, the migration cost hits first of all, only the high-skilled market and, second of all, particularly the jobs that exist only in good times. Employment protection reduces the share of these jobs, and therefore reduces the negative effect of the migration cost on job creation. The simulations showed that introducing an employment protection legislation would make the high-skilled workers better off and the low-skilled workers worse off. The general welfare effect could however be positive. The problem is that introducing a firing cost would not be politically feasible as the majority of workers is low-skilled. To overcome this problem, one may think of an asymmetric regulation system that protects high-skilled workers and do not protect low-skilled workers. The disadvantage of such a policy is the negative effect on the total share of workers investing in education. Policies such as public subsidies to education and subsidies to migration could therefore be adequate complements to the employment protection legislation. The facts seem to support this idea. Indeed, European countries with typically high migration costs are also the ones with the strictest employment protection legislation and the largest shares of public subsidies to tertiary education.

4.7 Appendix

4.7.1 Proof of proposition 7

We focus on the case where dying jobs exist. Using the three equilibrium conditions on the high-skilled market, the effect of a change in the migration cost on $\theta_{h,g}$, $\underline{x}_{h,g}$ and $U_{h,g}$ is determined as follows:

$$\begin{pmatrix} -\frac{c_r q'(\theta_{h,g})}{q(\theta_{h,g})^2} & -\frac{\beta}{1-\beta}(c_r + c_f(1-F(\underline{x}_{h,g}))m'(\theta_{h,g}) & 0 \\ \left(F(\widetilde{x}_h) - F(\underline{x}_{h,g})\right)\frac{(r+n)(1-\beta)}{r+n+\lambda} & 1 & -\frac{r+n}{\sigma p} \\ +(1-F(\widetilde{x}_h))(1-\beta) & & \\ 0 & c_f f(\underline{x}_{h,g})m(\theta_{h,g}) & 1 \end{pmatrix} \begin{pmatrix} \frac{\partial \theta_{h,g}}{\partial c_m} \\ \frac{\partial U_{h,g}}{\partial c_m} \\ \frac{\partial \underline{x}_{h,g}}{\partial c_m} \end{pmatrix}$$

$$= \begin{pmatrix} \left(F(\widetilde{x}_h) - F(\underline{x}_{h,g})\right)\frac{(1-\beta)\lambda}{r+n+\lambda} \\ 0 \\ -\frac{\lambda}{\sigma p} \end{pmatrix}$$

This leads to the following expression for $\frac{\partial U_{h,g}}{\partial c_m}$:

$$\begin{aligned} \frac{\partial U_{h,g}}{\partial c_m} &= \frac{\beta}{1-\beta}\left(c_r + c_f(1-F(\underline{x}_{h,g})m'(\theta_{h,g})\right)\left(F(\widetilde{x}_h) - F(\underline{x}_{h,g})\right)\frac{(1-\beta)\lambda}{r+n+\lambda} \\ &\quad -\frac{c_r q'(\theta_{h,g})}{q(\theta_{h,g})^2} c_f f(\underline{x}_{h,g})m(\theta_{h,g})\frac{\lambda}{\sigma p} \end{aligned} \tag{4.59}$$

which implies that $\frac{\partial U_{h,g}}{\partial c_m} > 0$.

Chapter 5

Employment Protection and On-the-job Investments

This Chapter is based on the paper "Welfare Effects of Employment Protection" (Belot, Boone and Van Ours (2002))[1].

5.1 Introduction

When Europe with its on average high unemployment is compared with the United States where unemployment is substantially lower, European rigidity and American flexibility are often emphasized. One of the institutions that is potentially incompatible with labor market flexibility is employment protection. There is a difference in employment protection between the US and Europe but also within Europe there is a big variety across countries. From an OECD (1999) overview it appears that Southern European countries stand out for having relatively strict employment regulation, along with France and Germany. At the other extreme, regulation is least restrictive in the United States, the United Kingdom, New Zealand and Canada. Differences in employment protection across

[1]The authors of the related paper thank participants to the ENTER Jamboree in Mannheim March 2001, to the European Economic Association Congress 2001 in Lausanne, to the European Association of Labour Economists Conference 2001 in Jyvaskyla and seminar participants at Uppsala for useful comments and suggestions.

countries are not very much related to differences in unemployment rates. However, as far as employment protection is concerned, it is not only unemployment that matters but also economic growth. Employment protection may have an effect on labor productivity through the slowing down of the reallocation from old and declining sectors to new and dynamic sectors. Still, as Nickell and Layard (1999) indicate, this effect will most likely be limited because quits already allow for a substantial downward adjustment of the workforce of a firm without any costs. They emphasize that instead of having a negative effect on labor productivity, employment protection may stimulate growth. The explanation they provide is that productivity improvements depend on the cooperation of workers, while also substantive participation requires training. Therefore, employment protection stimulates growth because it increases job tenure and thus provides an incentive for job training.[2] To illustrate this they present cross-country estimates of productivity growth from which it appears that employment protection is the only institution that has a positive effect whereas the other labor market institutions do not seem to have any effect on growth.

Employment protection involves costs for employers that want to adjust their workforce. Employment protection is also a commitment device for the employer, which stimulates workers to make productivity enhancing investments in firm specific human capital. This trade-off between adjustment costs and productivity growth is the focal point of this study. If employers would not offer employment protection, workers can be fired on the spot. Without employment protection workers severely underinvest in relationship-specific capital due to a hold-up problem. Employment protection reduces the probability that workers are dismissed after they have made an effort. Hence, employment protection might be desirable both from the point of view of the worker (job stability and wage gains) and of the firm (productivity gains). No contract is ever-lasting in the sense that

[2]Employment protection may be provided through labor laws but also through the private market, collective bargaining agreements and court decisions.

employers offer workers contracts that ensure the workers of a job until they retire. On the arrival of negative productivity shocks employers may decide to fire a worker despite of the costs involved. Even if employers would offer all workers ex ante the same contract, i.e. a contract with the same firing costs there may be differences in job tenure related to the productivity of the worker. Low productivity workers are more vulnerable to negative external shocks. Conditional on a particular shock high productivity workers may keep their job while low productivity workers are made redundant.

This Chapter investigates the relationship between employment protection and investments in human capital. This relationship goes in both directions: Employment protection stimulates investments in human capital on-the-job but the human capital of the workers at the beginning of an employment relationship determine the optimal employment protection from a welfare point of view. Chapter 4 studies also the relationship between human capital and employment protection but from a different angle. It shows that employment protection stimulates investments in specialized human capital prior to the entry into the labor market and the human capital determines the political preferences with respect to employment protection (see Table 1.14 for an overview).

The Chapter is set up as follows. Section 5.2 provides an overview of stylized facts on employment protection regulation. There are substantial differences across countries. Many countries have substantially changed their employment protection regulation towards more flexibility. Section 5.3 offers an overview of the most relevant theoretical and empirical studies on employment protection legislation. From the empirical studies it appears that employment protection does not affect unemployment much but may have effects on labor market dynamics and economic growth. Theoretical studies analyze employment protection from different angles. Most of the theoretical studies consider employment protection as a cost incurred by the firm. Productivity is present in some of them but is treated exogenously. The trade-off between costs and productivity gains from employment protection constituted the originality of this Chapter. Section 5.4 presents

a theoretical matching model, where initially employment regulation is introduced with one type of contract. Productivity is uncertain while there is some information about the potential suitability of the worker for the job at the time firm and worker meet. On the basis of this potential suitability employers decide whether or not to offer a contract and conditional on the offered contract workers decide whether or not they will make a productivity enhancing investment. Employment protection enhances the incentives of the workers to invest in human capital in order to reduce the probability of being fired. Hence, when the firm offers a contract with high separation costs, it commits itself to a stable employment relationship, i.e. it offers a guarantee to the worker that he won't be easily fired. Before production starts the productivity of the match is fully revealed. Then, either the firm and the worker find it efficient to separate or production starts. It is shown that for a given productivity there is an optimal degree of employment protection. If there is a productivity distribution it is welfare improving if different types of contracts, i.e. contracts with different firing costs, are offered. Section 5.5 presents a numerical example to illustrate the main characteristics of the model. It shows that the optimal employment protection depends on the productivity of the workers. Section 5.6 concludes.

5.2 Employment protection - stylized facts

Employment protection refers both to regulations concerning hiring and firing. It may concern rules favoring disadvantaged groups, conditions for using temporary or fixed-term contracts, training requirements but also redundancy procedures, mandated pre-notification periods and severance payments, special requirements for collective dismissals and short-time work schemes (see OECD (1999) for an overview). The common element in these rules is that they increase adjustment costs and thus job tenures.

When considering the potential welfare effect of employment protection, it is inter-

esting to look at differences between countries in terms of the strictness of employment protection and the range of contracts offered in terms of temporary or more or less permanent nature.[3] Section 1.2.2. (Table 1.11) presents the indicators relative to the EPL and a description of its evolution over time and differences across countries. It also reports the incidence of temporary employment in most OECD countries.

There are several reasons for the existence of temporary contracts. First, temporary employment is often considered as a way of providing flexibility to the firms, i.e. allowing them to adjust employment with relatively low costs to the variations in demand (Bentolila and Dolado, 1994). The most traditional and broadly accepted reason for using temporary contracts remains linked to the type of activity (seasonal or limited in duration). Temporary contracts may also be used as a step in the screening process towards a permanent employment relationship, or as a form of active labor market policy (OECD, 1999).[4] The growth of temporary employment may also have been stimulated by changes in the labor supply. The increased participation of women in the labor force is often considered as an important factor in the growth of temporary employment (OECD (1999)). Finally, there are studies focusing on the role of other institutional characteristics, e.g. Golden and Appelbaum (1992) who suggest that a reduction in the union bargaining power has enhanced the growth of temporary contracts. Their argument is that when labor's bargaining strength is high, firms are hindered to add temporary rather than permanent employees.

[3] Temporary employment covers in general two categories of contracts: fixed-term contracts and temporary work agency (TWA) contracts. Fixed duration contracts are employment relationships concluded directly between the employer and the worker. TWA contracts are employment relationships between a temporary work agency and the worker, the latter working for and under the control of a user firm (Peeters (1999)). See Delsen (1995) for an overview of the various definitions of temporary employment across OECD countries.

[4] The majority of temporary employed was employed the year before (OECD, 1996). However there is a reasonable part (varying between 8.7% in Spain and 31.9 % in Luxembourg, 1994) that was not participating to the labor market. When one looks at the status of temporary employed one year later, it appears that two-thirds are still under a temporary contract in Spain and Germany, while an important proportion of them benefits from a permanent contract in France (31.7%) and Great Britain (25.3%).

Interesting for the purpose of this study, temporary employment is unequally spread among the population and sectors of activities. Bentolila and Dolado argue that temporary employment is prevalent among people with an unstable attachment to the labor force. Unskilled and semi-skilled workers are over-represented in this type of employment. De Grip et al. (1997) note that sixty-three percent of all temporary employed are in low-skilled occupations. Temporary matches would therefore be less productive. One of the explanations suggested by Bentolila and Dolado is that fixed-term contracts would be associated with low investments in human capital and less effort from the workers. This Chapter argues that the relationship between productivity and temporary employment goes also the other way around: It would be optimal to offer short duration contracts to low productive matches.

5.3 Related literature

5.3.1 Empirical studies on employment protection

The relationship between employment protection and unemployment has been studied frequently in the context of an international comparison of labor market institutions. Nickell (1998) for example concludes on the basis of a comparison of 20 OECD countries that employment protection has no effect on the unemployment rate. Scarpetta (1996) finds that employment protection increases unemployment and extends the period of employment adjustment. Bertola (1992) finds no relationship between employment adjustment costs and the level of unemployment. Elmeskov et al. (1998) find that employment protection increases unemployment in countries with an intermediary level of corporatism. Chapter 2 of this manuscript shows that employment protection has a negative effect on unemployment when bargaining is at the firm level. Nickell and Layard (1999) scrutinize empirical evidence on the relationship between labor market institutions and economic performance. As far as unemployment is concerned they advocate a focus on unions and social security

systems. The negative effect of unions can be reduced by encouraging product market competition. Social security systems can be improved by linking benefits to active labor market programs that move people from welfare to work. Nickell and Layard conclude that time spent worrying about strict labor market regulations, employment protection and minimum wages is probably time largely wasted. The OECD (1999) also concludes that employment protection has little or no effect on overall unemployment. Employment protection regulation does seem to influence the dynamics of the labor market and in particular unemployment flows (Bentolila and Bertola (1990)). The rates of job creation and job destruction on the other hand seem to be less sensitive to employment protection. They do not differ strongly between North-America and European countries, suggesting that the role of employment protection regulation is small.

As indicated in the introduction Nickell and Layard (1999) conclude from a cross-country comparison of the effects of labor market institutions on economic growth that only employment protection matters. This is in line with a cross-country analysis in OECD (1999), which shows that workers on temporary contracts are less likely to be trained.

5.3.2 Theoretical studies on employment protection

The relationship between employment protection and labor market performance has been studied from different angles.[5] Bentolila and Dolado (1994) for example suggest an extension of the insider-outsider model to analyze the case of Spain. The basic idea is that unionized permanent workers, dominating the wage bargaining of all workers, see their bargaining power increasing with the share of temporary employment. Indeed, the pres-

[5] This overview is limited to the direct effects of employment protection. There are some studies that consider the interactions of employment protection with other labor market institutions. Coe and Snower (1997) analyze systematically all kind of theoretical interactions between various labor market institutions. Bertola and Rogerson (1997) suggest that the effects of employment protection depend on the wage institutions.

ence of a buffer of flexible employees lowers the likelihood that insiders will lose their jobs and thereby increases their bargaining power. The consequence is a widespread increase in wages damaging labor market performance.

Other studies analyze the effect of employment protection in the context of labor market flows. Boeri (1999) attempts to reconcile the empirical evidence of relatively high destruction rates and low unemployment inflows in Europe with the theoretical implications of the equilibrium labor market flows literature. He argues that employment protection actually increases the proportion of job-to-job shifts, i.e. a large number of workers move directly to another job, without experiencing unemployment. Holmlund and Linden (1993) consider a similar model where employed have a chance to avoid unemployment at the end of a long-term employment relationship, by ending up in a temporary public job. From this job they search for another job and compete with unemployed.

Wasmer (1999) argues that the share of temporary contracts relative to the share of long-term contracts depends on the productivity growth rate. High growth rates make long-term contracts attractive to firms. Downturns are associated with a shift towards temporary contracts. The coexistence of two types of contracts is guaranteed by a decreasing matching efficiency of the vacancies of one type when the number of vacancies of this type is rising. There is a threshold for the growth rate, above which the productivity of the match is so high there are only long-term vacancies posted. Employment protection makes sense here because it enables firms to protect high productive matches. Productivity determines therefore the optimal contract the firms should offer. But it enters the model exogenously. Employment protection enables the firms to keep high productive matches but does not have a direct effect on productivity itself. This effect also occurs in the model, but its originality is that the relationship also goes the other way around: The protection of contracts stimulate the productivity of the corresponding matches.

Hogan and Ragan (1997) also model employment protection in a matching framework.

The provision of job security is defined as the proportion of firms offering a secure contract rather than a risky contract, where risky contracts are characterized by a higher layoff rate. They use a matching function with increasing returns-to-scale which generates multiple equilibria. On the one hand, when the proportion of firms offering job security is small, flows into and out of unemployment are large and so is the arrival rate of an unemployed to a vacancy. This reinforces the attractiveness of risky contracts. On the other hand, a lot of employment protection generates a relatively small arrival rate, which makes it more attractive for firms to offer secure contracts.

Estevez-Abe et al. (2001) focus on the relationship between employment protection and skills. Employment protection gives workers incentives to invest in firm-specific skills, while the absence of employment protection would stimulate investments in general, portable skills. Wasmer (2002) has the same argument and suggests that American workers invest more in general skills while European workers invest more in firm-specific skills.

In conclusion most of the theoretical studies consider employment protection as a cost incurred by the firm[6]. The gains for the worker associated with employment protection concerns the stability of the employment relationship and the increased wage (insider effect). As the next subsection describes in more detail, the productivity enhancing effect is added to this insider effect. Productivity is present in other studies on employment protection but is then not directly influenced by the type of employment protection. It can be an aspect determining the contract choice (as in Wasmer (1999)) but basically once the firm and the worker have met, the future of their relationship depends on exogenous events. The model combines the cost-aspect of employment protection with its influence on the behavior of the partners (in particular of the workers) within the employment relationship. This introduces a trade-off between productivity gains and costs.

[6] Welfare effects of severance payments and notices of termination are investigated in Pissarides (2001) and Lazear (1990).

5.3.3 Investments in general and specific skills

This paper introduces endogenous investment decisions by the workers so as to enhance the productivity of the match. There is a larger literature on on-the-job investments. Becker (1964) in his seminal work introduced the crucial difference between general and specific investments. The latter are lost when separation between the firm and the worker occurs while the worker takes the benefits from the general investments with him as soon as he leaves the firm. The conclusion reached by Becker was then that workers should bear the costs of general investments. But his reasoning was made within a frictionless framework. Recent contributions (Acemoglu and Pischke (1998)), show that in a market with search frictions, it may be profitable for the firms to finance general investments as a worker cannot find immediately another equivalent partner. In the same line of reasoning, Wasmer (2002) shows that the American market (with its fast mobility between jobs) favours rather general investments by the workers than specific ones. On the European market on the other hand (characterized by high mobility costs), workers would prefer to invest in specific skills, so that the duration of their job is longer. The consequence is then that American workers experience lower losses when becoming unemployed than European workers.

5.4 The model

This section presents a model formalizing the idea that firing costs stimulate firm specific training by the employee and hence can be welfare enhancing. To make this point most forcefully, firing costs are assumed to be a pure waste (e.g. paper work involved in firing an employee). Subsection 5.4.5 considers firing costs as a transfer (either to employee or government). The exact form of the firing cost affects the nature of the contractual incompleteness one needs to assume in order to get the positive welfare effect of firing costs. Hence the discussion on contracts is postponed to section 5.4.5 as well.

The model is a one shot version of the Mortensen-Pissarides (1994) matching model. Similar one shot versions have been used by Boone and Bovenberg (2002) and Hosios (1990). This simplification allows for the introduction of an additional decision margin (effort choice of a worker) while analytical results can still be derived. The model consists of four stages of which the timing is as follows.

At $t = 0$, firms post vacancies v at a cost c_r per vacancy and workers supply inelastically one unit of search intensity.[7] Workers are distributed on the unit interval $[0, 1]$ with measure one. The number of workers and firms that match is determined by a matching function $m(u, v)$ where the number of unemployed u in this one shot game equals the total mass of workers, $u = 1$. Defining market tightness as $\theta = \frac{v}{u}$, in this case $\theta = v$ and the matching function can be written as $m(\theta) = m(1, \theta)$, with the usual assumptions: $m(0) = 0, m'(\theta) > 0, m''(\theta) < 0$ and $\frac{m(\theta)}{\theta}$ is decreasing in θ. Once the worker and the firm are matched the suitability of the worker for the job, x, is revealed. In this section the suitability x is the same for everyone. The next section shows what happens if x differs between workers ex post.

Because here everyone has the same suitability x, every worker who is matched with a firm gets a contract and the contract stipulates a firing cost c_f.[8] The fraction $(1 - m(\theta))$ of workers that are not matched, stay unemployed and receive unemployment benefit $b \geq 0$.

At $t = 1$ the worker invests effort e at cost $\gamma(e)$ to raise his productivity in this match. Because this is a one-shot model, this effort e is firm specific. An important assumption

[7] One could endogenize workers' search effort by introducing a search cost function for workers. This would complicate notation but does not affect the results. The reason for this is as follows. In this type of model, agents tend to search too little because part of the surplus created goes to the government as tax revenue. Firing costs in this context raise the wage for the worker and hence stimulates search. Hence the welfare enhancing effect of firing costs is strengthened by endogenizing workers' search effort.

[8] Strictly speaking there is also the possibility that x is so low that no one gets a contract. Since x is known ex ante this implies that no vancancies are posted at $t = 0$. This irrelevant case is ignored and x is assumed to be big enough.

is that e cannot be contracted[9] and that the cost is born by the worker[10]. One can think here of effort invested by the worker to get to know the firm, the procedures used, effort to help colleagues or effort invested in a formal training program. As noted above, the contractual problems surrounding e are discussed in section 5.4.5.

After this effort e has been sunk, the industry conditions ι are revealed at $t = 2$. The industry shock $\iota \in \Re$ is randomly distributed with density function $g(.)$ and distribution function $G(.)$. The following simple relation between the suitability for the job, x, the effort choice, e, the industry shock, ι, and total output of the match y is assumed:

$$y = x + e + \iota \tag{5.1}$$

After ι has been revealed, it may be the case that the worker and firm decide to split up if ι is rather low. In that case, the firm pays the firing cost c_f and the worker becomes unemployed. These unemployed workers receive an unemployment benefit b (just as their fellow workers that did not match with a firm at $t = 0$).

The worker and firm combinations that do not separate produce output y at $t = 3$. Furthermore, the firm and the worker bargain about the wage rate. The final output is the numeraire and it is assumed that there are no other production costs than labor costs.

In the following subsections, the model is solved using backward induction. First, the wage rate and profits are derived, then the workers' effort choice e and finally the number of vacancies posted by the firms.

[9] This means that the effort is not observable but the productivity resulting from the effort is.

[10] Are only considered here investments made by the workers as these are the ones one should look at when considering employment protection, as the latter represents a cost incurred by the firm, and therefore, a tool at the disposal of the *firms* to guarantee to the workers that they will not be fired easily. For the reader interested in investments made by firms (in general or specific human capital), see Acemoglu and Pischke (1998)).

5.4.1 Wages and profits

The surplus y is divided by the worker and the firm using Nash bargaining. Thus, the wage is determined by the following maximization problem

$$\max_{w} (w-b)^{\beta} (y-(1+t)w-T+c_f)^{1-\beta}, \tag{5.2}$$

where β $(1-\beta)$ is the worker's (firm's) bargaining power, b is the unemployment benefit level and thus the worker's fall back position, t and T denote components of the wage tax levied by the government and c_f is the firing cost. That is, $-c_f$ is the fall back position of the firm: if the worker and firm do not reach agreement on the wage, the worker is fired and the firm has to pay the firing cost c_f. It follows from this that the worker's wage w and the firm's profit π equal

$$\begin{aligned} w &= \frac{\beta}{1+t}(y-T+c_f)+(1-\beta)b, & (5.3)\\ \pi &= (1-\beta)(y-T-(1+t)b)-\beta c_f, & (5.4) \end{aligned}$$

Part of the surplus y that is not distributed to firm or worker goes to the government as tax income:

$$\begin{aligned} taxes &= y-w-\pi, & (5.5)\\ &= tw+T, & (5.6) \end{aligned}$$

The worker and firm will separate after ι has been revealed if and only if the joint surplus they generate is less than the sum of their outside options. Due to Nash bargaining, one can verify that the following two conditions are identical:

$$\begin{aligned} \pi &\leq -c_f, & (5.7)\\ w &\leq b, & (5.8) \end{aligned}$$

That is, the firm and worker always agree on when to separate: profits are below the outside option $(-c_f)$ if and only if wages are below the outside option (b). It is routine to verify that this can be reformulated as follows.

Lemma 5.1 *The firm and the worker separate after ι has been revealed if and only if*

$$y \leq \widetilde{y}$$

where

$$\widetilde{y} \equiv (1+t)\, b + T - c_f \tag{5.9}$$

Given x and e, the probability that the worker and firm separate is given by

$$\Pr\left(x + e + \iota \leq \widetilde{y}\right) = G\left((1+t)\, b + T - c_f - e - x\right) \tag{5.10}$$

Hence, the worker and firm continue after the industry shock if and only if output y exceeds the gross wage costs of a wage equal to the unemployment benefit (worker's outside option) minus the firing cost (firm's outside option). For given values of e, b, t and T, a rise in the firing cost c_f implies that fewer matches are dissolved.

5.4.2 Effort choice

This section derives the effect of the firing cost on worker's effort investment. To do this, the wage rate in (5.3) is written explicitly as a function of effort e and industry shock ι.

$$w\left(e, \iota\right) = \frac{\beta}{1+t}\left(x + e + \iota - T + c_f\right) + (1-\beta)\, b, \tag{5.11}$$

What is important here is that the worker and firm bargain over the wage after the effort e has been sunk. In other words, there is a hold up problem. One would expect the worker and firm to look for opportunities to remove this hold up problem. Section 5.4.5 discusses what type of contractual incompleteness one needs to assume so that the worker and firm cannot solve the hold up problem themselves.

The worker choosing e solves the following maximization problem.

$$\max_{e} \left\{ -\gamma\left(e\right) + G\left(\widetilde{y} - e - x\right) b + \int_{\widetilde{y}-e-x}^{+\infty} w\left(e, \iota\right) g\left(\iota\right) d\iota \right\}, \tag{5.12}$$

where the effort costs satisfy by assumption $\gamma\left(0\right) = 0$ and $\gamma'\left(.\right), \gamma''\left(.\right) > 0$. In words, raising the effort level e raises the effort cost $\gamma\left(e\right)$ and has two beneficial effects. First,

as e goes up, it becomes less likely that the worker is fired. Second, raising e raises the wage that the worker receives if the match is not dissolved. The first order condition for this maximization problem implies that marginal costs are equal to marginal benefits:

$$\gamma'(e) = [1 - G(\widetilde{y} - e - x)] \frac{\beta}{1+t}, \tag{5.13}$$

The second order condition is satisfied if $\gamma''(e) - \frac{\beta}{1+t} g(\widetilde{y} - e - x) > 0$. If $\gamma''(e) - \frac{\beta}{1+t} g(\widetilde{y} - e - x) > 0$ holds for all $e \geq 0$ then equation (5.13) has a unique solution.

Lemma 5.2 *The effects of the firing cost c_f and the suitability for the job x on effort e is as follows*

$$\frac{\partial e}{\partial c_f} > 0$$
$$\frac{\partial e}{\partial x} > 0$$

The intuition for these results is as follows. As c_f goes up, it becomes less likely that the worker is fired. Hence it becomes more likely that the effort e will yield a revenue in terms of a higher wage. Similarly, as x goes up, it becomes less likely that the worker is fired and hence he is more willing to invest effort e.

5.4.3 Vacancies

This section determines the number of vacancies that are created in the economy at $t = 0$. Profits can be written explicitly as a function of e and ι.

$$\pi(e, \iota) = (1 - \beta)(x + e + \iota - T - (1+t)b) - \beta c_f, \tag{5.14}$$

Then the expected value of being matched with a worker equals

$$\begin{aligned} E(J) &= -G(\widetilde{y} - e - x) c_f + \int_{\widetilde{y}-e-x}^{+\infty} \pi(e, \iota) g(\iota) d\iota, & (5.15) \\ &= [1 - G(\widetilde{y} - e - x)](1 - \beta)(x + e + c_f - T - (1+t)b) - c_f + \\ &\quad + (1 - \beta) \int_{\widetilde{y}-e-x}^{+\infty} \iota g(\iota) d\iota, & (5.16) \end{aligned}$$

We assume that there is free entry into the business of posting vacancies. Hence the vacancy cost equals the expected value of a vacancy.

$$c_r = \frac{m(\theta)}{\theta} E(J) \tag{5.17}$$

where $\frac{m(\theta)}{\theta}$ is the probability that a firm is matched with a worker.

The effect of c_f on the number of vacancies follows from the effect of c_f on the expected value of a match $E(J)$.

$$\frac{\partial E(J)}{\partial c_f} = -1 + [1 - G(\widetilde{y} - e - x)](1 - \beta)\left(1 + \frac{\partial e}{\partial c_f}\right) \tag{5.18}$$

A rise in firing costs reduces a firm's expected profits for two reasons. First, it increases the direct cost at separation and second, the wage goes up since the firing costs improves a worker's bargaining position relative to the firm. This would suggest that a rise in firing costs is always bad news for the firm. The next lemma derives conditions under which that is the case. However, there is also a positive effect of the firing cost for the firm. Higher firing costs imply a higher effort investment by the worker and hence a higher surplus y to be divided. If effort e is sufficiently elastic (or equivalently, $\gamma(.)$ sufficiently linear), the last effect dominates and the firm gains as firing costs go up.

Lemma 5.3 *If $G(\widetilde{y} - e - x)$is close to 1 then $\frac{\partial E(J)}{\partial c_f} < 0$. There exist functions $\gamma(e)$ such that $\frac{\partial E(J)}{\partial c_f} > 0$.*

The intuition for the first effect is as follows. The beneficial effect for the firm of a rise in c_f is that it raises worker's effort. However, if it is unlikely that the match survives ($G(\widetilde{y} - e - x)$is close to 1) this effect on effort is small. On the other hand, if it is likely that the worker has to be fired, a rise in c_f raises expected firing costs substantially. The second result says that there are functions $\gamma(.)$ such that the elasticity of effort with respect to c_f is big. In that case, a small increase in firing costs leads to a big rise in effort and hence a big rise in a firm's profits. In that case, the rise in firing costs is beneficial to the firm.

5.4.4 Welfare and normative results

In the model there are two externalities which create beneficial effects of firing costs. First, there is a hold up problem which causes workers to underinvest in effort. A rise in firing costs induces a higher effort level and hence can be welfare enhancing, even though the firing cost is a pure waste from a social point of view (i.e. it is not a transfer). Second, because of taxation the social value of a match exceeds the private value of a match. This causes the private parties to dissolve too many matches. Some matches are dissolved which have a positive social value because of the tax revenues generated by it. Introducing a firing cost stops some of these matches from being dissolved and hence can be welfare enhancing. This section derives conditions under which the welfare maximizing firing cost is strictly positive.

Welfare is defined as the sum of utilities of workers and firms. The expression for the expected value of a match for a firm is derived in equation (5.15) above. The analogous equation for expected value for a worker of being matched with a firm is

$$E(W) = -\gamma(e) + G(\widetilde{y} - e - x)\, b + \int_{\widetilde{y}-e-x}^{+\infty} w(e,\iota)\, g(\iota)\, d\iota, \tag{5.19}$$

Welfare Ω can be written as

$$\Omega = (1 - m(\theta))\, b + m(\theta)\, E(W) + m(\theta)\, E(J) - c_r\theta, \tag{5.20}$$

Using the government budget constraint

$$taxes = g + [1 - m(\theta) + m(\theta)\, G(\widetilde{y} - e - x)]\, b, \tag{5.21}$$

we can write welfare as

$$\Omega = -g + m(\theta)\left[-\gamma(e) - G(\widetilde{y} - e - x)\, c_f + \int_{\widetilde{y}-e-x}^{+\infty} (x + e + \iota)\, g(\iota)\, d\iota\right] - c_r\theta, \tag{5.22}$$

Maximizing welfare with respect to effort e yields that the first best effort level is determined by

$$\gamma'(e) = g(\widetilde{y} - e - x)\,((1+t)\, b + T) + [1 - G(\widetilde{y} - e - x)], \tag{5.23}$$

Simple comparison of this equation with (5.13) yields the following result.

Lemma 5.4 *If* $t > 0$ *and* $(1+t)\,b+T > 0$ *then the first best effort level exceeds the effort in the private outcome*

There are two reasons for this effect. First, there is the hold up problem ($\frac{\beta}{1+t} < 1$): the worker bears all the cost of the effort e but gets only a fraction of the gains. In particular, part of the additional output of the worker's effort is shared with the firm and the government. Second, the matches with $y \in \langle 0, (1+t)\,b+T-c_f\rangle$ are dissolved because they yield no private surplus although they do yield social surplus as $y > 0$. By raising e such matches with strictly positive social value are saved.

Next the socially optimal number of vacancies (or tightness) is compared with the private outcome. Maximizing welfare with respect to θ yields

$$m'(\theta)\left[-\gamma(e) - G(\widetilde{y}-e-x)\,c_f + [1-G(\widetilde{y}-e-x)]\,(x+e) + \int_{\widetilde{y}-e-x}^{+\infty} \iota g(\iota)\,d\iota\right] = c_r$$

Multiplying both sides with $\frac{\theta}{m(\theta)}$ and defining the elasticity of the matching function as $\alpha = \frac{m'(\theta)\theta}{m(\theta)}$ this equation can be written as

$$\frac{c_r\theta}{m(\theta)} = \alpha\left[-\gamma(e) - G(\widetilde{y}-e-x)\,c_f + [1-G(\widetilde{y}-e-x)]\,(x+e) + \int_{\widetilde{y}-e-x}^{+\infty} \iota g(\iota)\,d\iota\right] \tag{5.24}$$

Comparing this equation with the market outcome in equation (5.17) one gets the following result.

Lemma 5.5 *Sufficient conditions for the socially optimal tightness* θ *to exceed tightness in the private outcome (see (5.17)) are*

$$\begin{aligned} \alpha &\geq 1-\beta \\ [1-G(\widetilde{y}-e-x)]\,(T+(1+t)\,b) + \frac{\beta}{1-\beta}c_f &\geq \gamma(e) \end{aligned}$$

The intuition for these conditions is as follows. The first inequality is related to the Hosios condition (see Hosios (1990)) and says that the firm's bargaining power should not be too big. The reason is that creating vacancies causes a negative external effect (congestion externality): if a firm opens an additional vacancy, the probability that other firms are matched with a worker is reduced ($\frac{m(\theta)}{\theta}$ is decreasing in θ). If the elasticity of the matching function α equals firm's bargaining power $(1-\beta)$ this externality is internalized and firms do not create too many vacancies from a social point of view. Clearly, if firm's bargaining power is even lower $(1-\beta \leq \alpha)$ firms are not overinvesting in vacancies either. The second inequality compares parts of the social surplus overlooked by the firm. First, tax revenues on surviving matches do not add to the firm's surplus and hence the firm tends to underinvest in vacancies. Second, part of the firing cost that is subtracted in firm's profits goes in fact to the worker (c_f raises worker's wages) and is not lost from a social point of view. Finally, since the worker bears all of the effort cost $\gamma(e)$ the firm does not take this cost into account when creating vacancies. This effect tends to work in the direction of the firm overinvesting in vacancies. The inequality implies that the first two effects dominate the latter and hence the firm underinvests in vacancies.

Proposition 5.1 *There exist effort functions* $\gamma(.)$ *such that*

$$\frac{d\Omega}{dc_f} > 0$$

for $c_f \in [0, \bar{c}_f\rangle$ *where* $\bar{c}_f > 0$.

This result implies that the socially optimal firing cost is strictly positive, although the firing cost is a pure waste from a social point of view. The intuition is that by raising the firing cost (from $c_f = 0$) workers' effort is increased which is below the social optimum and fewer matches are destroyed which have a strictly positive social value.

This result cannot hold for all effort functions. Suppose for instance that effort is

costless until $e = 1$ and infinitely expensive for $e > 1$.[11] Then all workers invest the socially optimal effort level already and raising c_f just raises costs for the economy (as firing costs are a pure waste). Hence, it must be the case that effort is sufficiently elastic to changes is c_f to get the positive welfare effect of c_f.

The welfare maximizing firing cost is finite, because as $c_f \to +\infty$, profits are reduced to zero and hence no vacancies will be created.

5.4.5 The nature of firing cost and contractual incompleteness

So far firing costs were assumed to be a pure waste, say paper work needed to fire an employee. Alternatively, one can distinguish firing cost as a firing tax paid to the government and severance pay which is a firing cost paid to the employee. For each of these types of firing costs the welfare effects of a rise in the firing cost and the sort of contractual incompleteness one needs to assume to defend government intervention in these cases are discussed.

In all three of these cases one needs to assume that the effort e of the worker is not contractible. This seems reasonable in many circumstances. Such effort costs are hard to observe and are usually not verifiable in court. Think here of a worker's effort to cooperate with colleagues, to behave towards customers etc. If this effort level were contractible, the hold up problem would disappear and there would be no case for firing costs.

Furthermore, one needs to assume that the firm cannot commit to leaving the gains from effort to the worker. For instance, the following contract would solve the hold up problem. The firm sells itself to the employee at $t = 1$ for a price equal to its expected profits, thereby leaving all gains from effort to the worker. This contract is infeasible if one assumes that the worker has a liquidity constraint. Again this is a reasonable assumption in most cases.

[11] That is, $\gamma(.)$ is of the form: $\gamma(e) = \begin{cases} 0 & \text{if} \quad e \in [0,1] \\ +\infty & \text{otherwise} \end{cases}$.

To defend government intervention in the case where the firing cost is a pure waste (created by the government), it is necessary to answer the question 'if this firing cost creates additional surplus, why don't the worker and firm write a contract themselves saying that money should be burned in case the worker is fired?' There are two answers to this question. First, although the firing cost may create additional welfare, it may be the case that the firm loses due to the firing cost (i.e. $\frac{\partial E(J)}{\partial c_f} < 0$). The only way in which the worker can induce the firm to sign a contract stipulating a firing cost is to compensate the firm ex ante. In other words, the worker bribes the firm to sign such a contract. Assuming that the worker has a liquidity constraint rules out such a contract and necessitates government intervention. Another argument why government intervention is needed even if the firm would gain from the firing cost (i.e. $\frac{\partial E(J)}{\partial c_f} > 0$) is given by Nickell and Layard (1999). They claim that adverse selection problems may be an important reason why private firms in the US do not offer employment protection themselves. The idea is here that there are two types of workers: one likes an easy life and job security, the other is willing to work hard and does not mind a bit of risk. By offering (unilaterally) a contract with high c_f, a firm attracts disproportionately the wrong type of worker. This makes the selection of workers very expensive. Hence firms only offer contracts with low firing costs.

If the firing cost takes the form of a transfer to the government (firing tax), then it is less surprising that a higher firing cost can raise welfare because the firing cost is not a waste from a social point of view. So in this case one needs fewer assumptions on the contractual incompleteness to make the story work. In this case, one only needs to assume that effort is not contractible, so that there is a hold up problem. The firing tax is then an excellent way for the government to raise revenue as it raises efficiency instead of decreasing it.

If the firing cost is a transfer to the employee (severance pay), it is again easier to get a welfare enhancing rise in the firing cost because it is not a waste from a social

point of view. On the question why the government needs to stipulate such contracts, similar arguments as above can be used (adverse selection problem; worker has a liquidity constraint). Note that in this case the level of the firing cost will be lower than in the two other cases because of the following moral hazard problem on the worker's side. One reason why the worker exerts effort is to avoid bankruptcy by the firm. If the worker gets severance pay c_f in case the match is dissolved, there is less incentive to try to avoid bankruptcy since the worker now gets $b + c_f$ instead of just b.

Summarizing, to get the welfare enhancing effect of firing cost one needs to assume that the worker's effort is not contractible. In order to make a case for the government to stipulate contracts with firing cost one needs to assume that either the worker has a liquidity constraint which prevents him from bribing the firm into a contract with firing costs or that firms face an adverse selection problems with different types of employees.

5.5 A numerical example

This section illustrates the functioning of the model by means of simulations. It assumes that no unemployment benefits are paid and there are no other government expenditures. Therefore, there are no taxes[12]. Furthermore, it is assumed that $g(\epsilon) \sim N(0, 4)$. The matching function has the following form: $m(u, v) = au^{\alpha}v^{1-\alpha}$, with $a = 0.9$ and $\alpha = 0.5$. The other parameters are specified as follows: $\alpha = \beta = 0.5$, $c_r = 2$, $\phi = 0.1, \gamma(e) = \frac{1}{2}\varphi e^2$. This combination of parameter values ensures plausible values of unemployment rates over a wide range of values for x. The initial situation is such that $x = 1.5$. The first column of Table 5.1 shows the simulation results with respect to a number of relevant parameters in case firing costs, $c_f = 0$. The effort $e = 4.7$. This induces the employers to open up many vacancies such that the matching probability is equal to 1. Every unemployed worker meets a vacancy. However, 6.1% of the matches split up immediately after the industry

[12]This approach is stylized and does not modify fundamentally the basic results.

conditions are revealed. Therefore, total unemployment equals 6.1%. Profits equal 3.15 and welfare 2.73.

If firing costs are introduced initially there is a decline in unemployment and an increase in welfare. This is shown in Figure 5.1. The decline in unemployment is caused by two opposite effects. First, because firing costs increase, profits decline and therefore less vacancies are created. This reduces the matching probability and has a positive effect on unemployment. Second, because firing costs increase, workers have an incentive to generate effort, which reduces the number of matches that split-up. This has a negative effect on unemployment. Initially, at low firing costs the second effect dominates the first effect. However, as firing costs keep increasing there is situation where almost all matches sustain. Then, the second effect is obsolete and only the first effect remains. Therefore, a further increase in firing costs will increase unemployment. Figure 5.1 shows that under the set of parameter values chosen the optimal value of the firing costs is $c_f^* = 0.70$. At this level of firing costs unemployment is at its lowest point and welfare is maximized. The second column of Table 5.1 shows the full simulation results in this optimum. Effort is now higher and less vacancies are opened. The matching probability is still 100%. Since productivity is higher less matches are destroyed in the optimum and the unemployment rate now equals 2.9%. Profits are lower but because there is more employment and productivity has increased welfare has also increased.

It is interesting to investigate whether it makes sense for employers to offer two types of contracts with different firing costs. The contract with the high firing costs resembles a permanent position (high expected duration) while the contract with the low firing cost represents a temporary position (low expected job duration). To get both types of contracts to be offered by firms in equilibrium x is allowed to vary over job matches. All workers are the same ex ante, but ex post their suitability for a job x may differ. Some workers are matched with a job for which they are very suitable (high x) some with a job for which they are not suitable (low x).

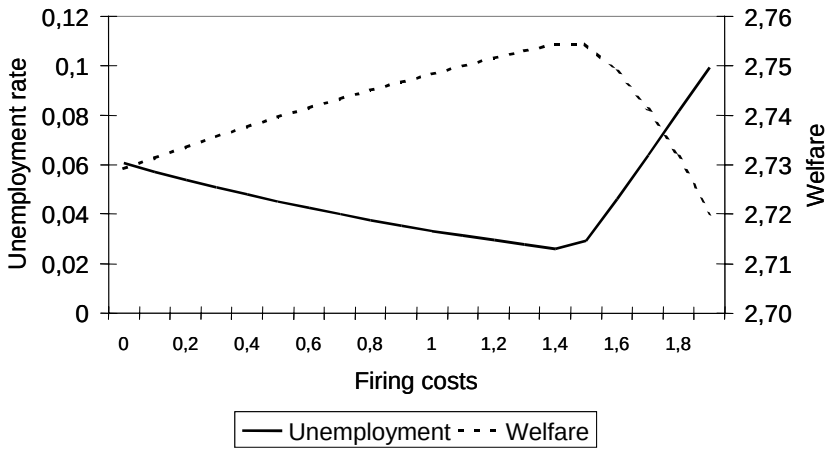

Figure 5.1: Firing costs, unemployment and welfare

Table 5.1 illustrates what happens if a worker is less suitable. The third and fourth column present simulation results in case $x = 1$. The third column of Table 5.1 presents the results in the case of no firing costs. The suitability for the firm is lower but the matching probability is still equal to 1. After the industry conditions are revealed more matches split-up than in the previous situation. Both effects result in an unemployment rate of 8.1%. The fourth column of Table 5.1 shows the situation of optimal firing costs. The optimal firing costs are lower than before, $c_f^* = 1.2$. Because of the introduction of firing costs workers generate more effort than before. But not every match sustains. And, the low suitability induces employers to generate less vacancies. Because of the low matching probability overall unemployment is higher than in the case of more suitable workers. Note that unemployment is higher with optimal firing costs than it is without firing costs.[13] Overall welfare is higher because even though less workers are productive, the productivity per worker is substantially higher.

The results that less suitable workers are offered less employment protection is intuitively clear. Note that due to the lower level of employment protection unemployment is higher for less suitable workers. The main reason for this is that for less suitable workers

[13] Unemployment is lowest (4.8%) if the firing costs are equal to 0.9.

	$x = 1.5$		$x = 1.0$	
	$c_f = 0.0$	c_f^*= 1.4	c_f= 0.0	c_f^*= 1.2
e	4.70	4.87	4.60	4.80
$Prob(match)$	1	1	1	0.94
$G(\epsilon)$	0.061	0.029	0.081	0.040
$u(\%)$	6.1	2.9	8.1	9.3
$profits$	3.15	2.46	2.87	2.33
$Welfare$	2.729	2.754	2.217	2.248

Table 5.1: Simulation results

employers find it less worthwhile to open up a lot of vacancies. In conclusion, for high productivity workers the welfare maximizing contract specifies a high firing cost. There may be a limit to this positive relationship. If the effort produced without employment protection is already high offering a lot of employment protection will not increase effort sufficiently if the effort function is very steep. Then, the costs of providing extra effort may be too high. So, it may be that for high levels of x there is a negative relationship between x and c_f^*[14] (c_f^* is the value of the firing cost that maximizes welfare under the set of parameter values chosen).

This conclusion is interesting since it corresponds to the observed facts: Low productive workers are over-represented in temporary employment (with low firing cost) relatively to long-term employment (with high firing cost).

5.6 Conclusion

This Chapter proposes a theoretical analysis of the welfare effects of employment protection. In the theoretical framework, the duration of the employment contract is endogenous. Firing costs associated with an employment contract serve as a commitment device for the firm and give incentives to workers to invest in productivity enhancing

[14] In the current parameter setting there is no negative relationship at higher levels of x. In order to generate such a relationship a different effort function would have to be used.

human capital. Employment protection can then be analyzed focusing on the trade-off between flexibility and commitment. In the initial situation, all workers have the same productivity. Then, it is shown that for a given productivity there is an optimal degree of employment protection. If there is a productivity distribution it is welfare improving if different types of contracts, i.e. contracts with different firing costs, are offered.

The optimal degree of employment protection is country-specific, i.e. depends on some parameter values that are specific to the countries. Over the last decade, many countries have substantially changed their employment protection legislation, towards more flexibility essentially. It could therefore be that they are now closer to their optimum. The important conclusion of this Chapter is that the optimal firing cost is in most cases larger than 0.

Finally, a nonlinear relationship between the firing cost and unemployment is derived, which may be one of the reasons why some empirical studies find that the employment protection legislation does not affect the unemployment rate.

5.7 Appendix

Proof of lemma 5.2

Differentiating equation (5.13) with respect to e and c_f, one gets

$$\left[\gamma''(e) - \frac{\beta}{1+t} g(\widetilde{y} - x - e)\right] \frac{\partial e}{\partial c_f} = g(\widetilde{y} - x - e) \frac{\beta}{1+t} \tag{5.25}$$

Hence $\frac{\partial e}{\partial c_f} > 0$ because the term in square brackets is positive due to the second order condition for e. In a similar way one can derive $\frac{\partial e}{\partial x} > 0$. Q.E.D.

Proof of Lemma 5.3

Clearly, if $[1 - G(\widetilde{y} - e - x)] \approx 0$, we have that $\frac{\partial E(J)}{\partial c_f} < 0$.

Substituting the expression for $\frac{\partial e}{\partial c_f}$ in (5.25) into equation (5.18) we get

$$\frac{\partial E(J)}{\partial c_f} = -1 + (1+t) \frac{1-\beta}{\beta} \gamma'(e) \frac{\gamma''(e)}{\gamma''(e) - \frac{\beta}{1+t} g(\widetilde{y} - e - x)}$$

Let $\hat{e}$ denote equilibrium value. Then, using a second order Taylor expansion, $\gamma(e)$ can be written as $\gamma(e) = \gamma(\hat{e}) + \gamma'(\hat{e})(e-\hat{e}) + \frac{1}{2}\phi(e-\hat{e})^2$ where $\phi = \gamma''(\zeta)$ for some ζ between e and $\hat{e}$. Changing the concavity of the function $\gamma(.)$ around $\hat{e}$ (while keeping $\gamma'(\hat{e})$ unchanged) affects how elastic e reacts to c_f, but does not affect the equilibrium $\hat{e}$. In other words, one can verify ϕ without changing $\hat{e}$. It is routine to verify that as ϕ comes close to $\frac{\beta}{1+t}g(\widetilde{y}-\hat{e}-x)$, the effect of c_f on e becomes big enough to make $\frac{\partial E(J)}{\partial c_f} > 0$. Q.E.D.

Proof of Lemma 5.5

Since $\frac{c\theta}{m(\theta)}$ is increasing in θ (by assumption), the socially optimal number of vacancies exceeds the private number of vacancies if and only if

$$\begin{aligned} & \alpha\left[-\gamma(e) - G(\widetilde{y}-e-x)c_f + [1-G(\widetilde{y}-e-x)](x+e) + \int_{\widetilde{y}-e-x}^{+\infty} \iota g(\iota)\, d\iota\right] \\ \geq\ & (1-\beta)\left\{[1-G(\widetilde{y}-e-x)](x+e+c_f-T-(1+t)b) - \frac{c_f}{1-\beta} + \int_{\widetilde{y}-e-x}^{+\infty} \iota g(\iota)\, d\iota\right\} \end{aligned}$$

If $\alpha \geq 1-\beta$ a sufficient condition for this inequality to hold is

$$\begin{aligned} & -\gamma(e) - G(\widetilde{y}-e-x)c_f + \\ \geq\ & [1-G(\widetilde{y}-e-x)](c_f-T-(1+t)b) - \frac{c_f}{1-\beta} \end{aligned}$$

which can be written as

$$[1-G(\widetilde{y}-e-x)](T+(1+t)b) + \frac{\beta}{1-\beta}c_f \geq \gamma(e)$$

Q.E.D.

Proof of Proposition 5.1

As shown in lemma 5.3, if $\gamma(.)$ is sufficiently elastic then we have $\frac{\partial E(J)}{\partial c_f} > 0$. It is clear that $\frac{\partial E(V_e)}{\partial c_f} > 0$ because c_f raises the wage rate. Furthermore, Nash bargaining implies that $w(e,\iota) \geq b$ for all matches that survive. Together with $\gamma(0) = 0$ it follows that $E(V_e) > b$. Hence $\frac{\partial E(J)}{\partial c_f} > 0$ implies that $\frac{\partial \theta}{\partial c_f} > 0$ and hence $\frac{\partial[(1-m(\theta))b+m(\theta)E(V_e)]}{\partial \theta} > 0$.

Furthermore, by choosing $\gamma(.)$ such that in the market equilibrium (determined by $\gamma'(e)$) it is the case that

$$[1 - G(\widetilde{y} - e - x)](T + (1 + t)b) + \frac{\beta}{1 - \beta} c_f \geq \gamma(e)$$

lemma 5.5 implies that the rise in θ is welfare enhancing as well. Q.E.D.

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Samenvatting (Summary in Dutch)

Dit proefschrift draagt bij aan de uitgebreide literatuur van arbeidseconomie. In een maatschappij waar werk zo een belangrijk deel uitmaakt van het leven, is het niet verrassend om te zien dat wetenschappers zoveel aandacht hebben besteed aan het analyseren van het functioneren van de arbeidsmarkt. De mate van belang van arbeidseconomie als veld is snel toegenomen nadat olieschokken in de jaren '70 de economie van ontwikkelde landen, en met name van Europese landen, aangetast hadden. De Verenigde Staten en in zekere mate andere Angelsaksische landen herstelden zich sneller dan de meeste Europese landen. De literatuur opende toen het debat dat de flexibele Verenigde Staten tegenover het institutioneel rigide Europa zette. Alhoewel het niet zonder meer duidelijk is wat achter deze relatief vage concepten schuilt, bestaat er nu een lange traditie in het geloof dat er belangrijke reguleringen in Europese landen waren die het aanpassingsproces op de arbeidsmarkt na de olieschok vertraagde. Zoals de titel van dit manuscript reeds aangeeft, is het de ambitie om te begrijpen wat voor effecten reguleringen op de arbeidsmarkt hebben en hoe ze tot stand zijn gekomen. Allereerst is er een behoefte aan een operationele definitie van de concepten "arbeidsmarktinstituties" en "arbeidsmarktprestaties". Arbeidsmarktinstituties zijn reguleringen die het evenwicht op de arbeidsmarkt wegdrijven van het competitieve evenwicht. Dit is niet de enige kracht, maar ongetwijfeld wel een belangrijke. Vandaar dat er belangstelling bestaat voor belastingen op arbeid, arbeidsstandaarden en ontslagbescherming, vakbonden, het systeem van loononderhandelingen, minimumlonen, uitkeringen, "actieve" arbeidsmarktpolitiek, onderwijspolitiek

en belemmeringen in geografische mobiliteit. De keuze is uiteraard tot op zekere hoogte arbitrair, daar sommige van deze instituties ook mensen aangaat die geen deel uitmaken van de totale arbeidskracht (zoals bij het belastingstelsel) en omdat er andere reguleringen zijn die hier niet genoemd worden maar wel invloed zouden kunnen uitoefenen op de arbeidsmarkt (zoals productmarktreguleringen etc.). Het functioneren van de arbeidsmarkt wordt aan de andere kant meestal beoordeeld op basis van verschillende indicatoren. Deze indicatoren kunnen oneindig verfijnd worden. Er zijn twee typen indicatoren: indicatoren die de voorraad meten, zoals het werkloosheidspercentage, het werkgelegenheidspercentage en de graad van deelneming, en indicatoren die stromen meten, zoals de creatie en destructie van banen, de in- en uitstromen in de werkloosheid, etc. Het lijkt erop dat sommige instituties een invloed hebben op de arbeidsmarktstromen, maar geen duidelijk effect hebben op de voorraad, en vice versa. Het is daarom nuttig het onderscheid te handhaven. De arbeidsmarktprestatie is slechts een onderdeel van de economische prestaties van een land. De effecten van arbeidsmarktinstituties moeten derhalve vanuit dat licht geanalyseerd worden. De economische groei en bevolkingsgroei zijn evenzo belangrijk, als niet belangrijker dan de situatie op de arbeidsmarkt. Het is cruciaal om dat in het achterhoofd te houden wanneer de vraag naar de consequenties van bestaande rigiditeiten wordt gesteld.

Er zijn veel studies in de literatuur die empirisch en theoretisch het effect van deze reguleringen bestuderen. Het geloof dat rigiditeiten in Europese landen verantwoordelijk zijn voor zwakke arbeidsmarktprestaties is gedeeltelijk bevestigd door empirisch werk. Maar sommige puzzels zijn onopgelost. Sommige landen die normaal gesproken als rigide worden geclassificeerd zijn er in geslaagd om de werkloosheidsgraad aanzienlijk terug te dringen. Het beste voorbeeld is Nederland, dat de werkloosheid met 10 procent zag dalen over de laatste 15 jaar. Dit proefschrift geeft enkele verklaringen voor dergelijke puzzels. Het basisargument is dat instituties niet intrinsiek slecht zijn, maar dat wat uitmaakt de combinatie van instituties is. Instituties hebben heel verschillende effecten in verschillende

landen en als gevolg daarvan kan een institutionele hervorming in het ene land een succes zijn terwijl het in een ander land verkeerd uitpakt. Sommige instituties hebben meer aandacht in de literatuur gekregen dan anderen. Er is dan ook een uitgebreide literatuur over de effecten van arbeidsbelastingen, werkloosheidsuitkeringen, en de effecten van vakbonden op de arbeidsmarkt. Wetgeving met betrekking tot ontslagbescherming, normaal gesproken gedefinieerd als de verzameling van reguleringen die het moeilijker maken voor een ondernemingen om haar werknemers te ontslaan, heeft tot recente datum minder aandacht gekregen. Dit is een reden waarom dit proefschrift dieper ingaat op de rol van zulke wetgeving. Een andere reden is dat er vraagtekens gezet zijn bij de effecten ervan op de slechte arbeidsmarktprestaties in Europa. De theoretische literatuur laat zien dat het effect van ontslagbescherming ambigu is, daar het zowel de creatie als destructie van banen vermindert. De empirische literatuur vindt geen significant effect van ontslagbescherming op de werkloosheidsgraad, en bevestigt daarmee in zekere zin de theoretische bevindingen. Echter, ontslagbescherming heeft een positief effect op de productiviteit per uur (zie Nickell en Layard (1999)). Bovendien heeft ontslagbescherming een negatief effect op de arbeidsmarktstromen als we kijken naar de snelheid van herverdelingen van lage naar hoge productiviteitsplaatsen. De strikte werkgelegenheidsbescherming zou verantwoordelijk kunnen worden gesteld voor het hoge aandeel van lange termijn werkloosheid in de meeste Europese landen. Dit zijn allen belangrijke aspecten die een nauwkeurige analyse van werkgelegenheidsbescherming rechtvaardigen. Sommige vraagstukken verdienen in het bijzonder de aandacht: waarom is werkgelegenheidsbescherming veel meer aanwezig in Europese landen dan in de Verenigde Staten? Heeft werkgelegenheidsbescherming zin? Is het politiek haalbaar om deze institutie te hervormen? Dit proefschrift geeft enkele antwoorden hierop.

Dit proefschrift is als volgt georganiseerd. Hoofdstuk 1 leidt de lezer in tot de belangrijkste ontwikkelingen in arbeidsmarktprestaties en instituties gedurende de laatste vier decennia. Tevens beschrijft het de literatuur binnen de arbeidseconomie die de origine

en consequenties van arbeidsmarktinstituties behandelt. De introductie geeft tevens een overzicht van de belangrijkste conclusies van dit proefschrift. Hoofdstuk 2 analyseert de effecten van arbeidsmarktinstituties op de werkloosheidsgraad in OESO landen, op basis van data over de periode 1960-1995. De laatste drie hoofdstukken zijn gewijd aan de analyse van ontslagbescherming. Hoofdstuk 3 geeft theoretische argumenten voor de verschillen in ontslagbescherming wetgeving tussen de Verenigde Staten en de meeste Europese landen. Hoofdstukken 4 en 5 laten zien dat ontslagbescherming zin heeft vanuit een welvaartstheoretisch oogpunt, wanneer men de investeringen in menselijk kapitaal in beschouwing neemt voor zover die voorafgaan aan het toetreden tot de arbeidsmarkt (hoofdstuk 4) of voor zover die op het werk zelf worden gedaan (hoofdstuk 5).

Het eerste deel van hoofdstuk 1 relateert de belangrijkste ontwikkelingen sinds het begin van de jaren '60 in arbeidsmarktinstituties en prestaties aan elkaar. De meest bestudeerde indicator voor arbeidsmarkten is ongetwijfeld die van de werkloosheidsgraad. Dit is waarschijnlijk zo omdat het de minst vrijwillige van alle posities op de arbeidsmarkt is. OESO landen zijn erg gedivergeerd in termen van de evolutie in werkloosheidsgraden na de olieschok van 1973. Drie groepen landen kunnen worden onderscheiden. Ten eerste de landen die niet significant beïnvloed zijn, zoals de Verenigde Staten, Japan, Noorwegen, Zwitserland en tot op zekere hoogte ook Canada. Dan is er een groep landen die een continue stijging hebben vertoond in de werkloosheidsgraad, zoals Oostenrijk, België, Frankrijk, Duitsland, Italië en Zweden. Tenslotte is er een groep landen die te maken hadden met een stijging in de werkloosheidsgraad na de olieschok maar die er vervolgens in geslaagd zijn die significant te laten dalen, zoals Denemarken, Ierland, Finland, Nieuw-Zeeland, Nederland en het Verenigd Koninkrijk. Een andere arbeidsmarktindicator van een voorraad die substantieel veranderd is over de tijd is de participatiegraad. Er zijn algemene trends in de evolutie ervan in alle OESO landen: een stijging in de participatiegraad van vrouwen en een daling in de participatiegraad van mannen en ouderen. Er zijn ook belangrijke verschillen tussen landen die gerelateerd kunnen worden

aan culturele of institutionele verschillen, zoals pensioenregelingen en onderwijssystemen. Kijkend naar de indicatoren van de dynamica van de arbeidsmarkten dan zien we dat de Verenigde Staten en Europese landen niet zo veel van elkaar verschillen in termen van herverdelingen in banen maar wel in termen van in- en uitstromen in de werkloosheid. De gemiddelde duur van werkloosheid loopt op tot 86,7 maanden in Spanje tegenover 2,2 maanden in de Verenigde Staten.

Er is ook geen eenduidig beeld wat betreft de arbeidsmarktinstituties. Ruw samengevat kan men drie groepen van landen onderscheiden. Ten eerste zijn er de flexibele gedecentraliseerde landen zoals de Verenigde Staten en de Angelsaksische landen. Vervolgens zijn er de rigide gecentraliseerde landen zoals de Scandinavische landen tot een decennium geleden. Tenslotte zijn er de rigide medium gecentraliseerde landen zoals continentaal en Zuid-Europa. De rigide medium gecentraliseerde landen zijn diegenen waar arbeidsovereenkomsten op industrieel niveau afgesloten worden. Flexibele gedecentraliseerde landen hebben voornamelijk arbeidsovereenkomsten op het bedrijfsniveau en de overheid speelt daar slechts een beperkte rol in het laten functioneren van de arbeidsmarkt. Zo is er een weinig stringente ontslagbescherming en zijn de belastingen en uitkeringen laag. Rigide gecentraliseerde landen hebben hoge belastingen en uitkeringen en een gecentraliseerd systeem van loononderhandelingen.

De theoretische literatuur over de effecten van arbeidsmarktinstituties kan in twee groepen worden verdeeld: de literatuur over loononderhandelingen en de literatuur over zoekmodellen. De eerste groep is met name nuttig in het bestuderen van de effecten van instituties op de voorraden in de arbeidsmarkt. Het richt zich op het proces van het vaststellen van lonen en werkgelegenheid. De tweede groep maakt een algemeen evenwichtsanalyse mogelijk van het functioneren van de arbeidsmarkt en richt zich op het herverdelingsproces van arbeid, met andere woorden op het dynamische aspect.

Hoofdstuk 2 is geïnspireerd door de eerste groep van modellen (loononderhandelingen) en richt zich met name op de ontwikkelingen in succesvolle OESO landen. Er is een uitge-

breide literatuur over de effecten van arbeidsmarktinstituties op de economische prestaties. Hier zijn veel lessen van geleerd, maar enkele puzzels bestaan nog. Een eerste serie van studies analyseerde de effecten van instituties op indicatoren zoals het werkloosheidspercentage, het werkgelegenheidspercentage en de groei van het nationaal product. Daarna zijn er verschillende uitbreidingen bestudeerd. Ten eerste is er de suggestie van Blanchard en Wolfers (2000) die suggereren dat Europese instituties op zichzelf niet slecht zijn, maar dat ze de manier waarop de economie reageert op schokken beïnvloeden. Ten tweede zijn er verschillende papers die suggereren dat het de combinatie van instituties is die belangrijk is en niet zozeer de instituties zelf. Met andere woorden, het institutionele raamwerk moet beschouwd worden als een verzameling van interactieve elementen. Hoofdstuk 2 gaat dieper in op dit laatste argument. Het theoretische model is een eenvoudige uitbreiding op het model van Nickell en Andrews (1983). Dit model is geschikt voor een analyse van de effecten van arbeidsmarktinstituties. Het model kan beschreven worden aan de hand van twee curven: een arbeidsvraagcurve en een loononderhandelingscurve. De instituties bepalen de elasticiteiten van deze twee curven en de grootte van de verschuivingen na een institutionele verandering. De conclusie van deze theoretische studie is dat institutionele hervormingen inderdaad sterk verschillende effecten kunnen hebben naar gelang het totale raamwerk van instituties. Een lage mate van centralisatie bijvoorbeeld, betekent een vlakke loon- en arbeidsvraagcurve (in een grafiek waar werkgelegenheid op de x-as wordt afgebeeld en het loon op de y-as). Dit betekent dat een institutionele hervorming voornamelijk effect zal hebben op de werkgelegenheid. De empirische studie gebruikt andere indicatoren dan de eerder genoemde studies. Sommige institutionele indicatoren die in eerdere studies gebruikt zijn vertonen erg weinig variatie over de tijd (zoals de index voor wetgeving met betrekking tot ontslagbescherming, centralisatie, coördinatie, etc.). Echter, belangrijke institutionele veranderingen zijn in sommige OESO landen geïncorporeerd die niet in deze indicatoren terugkomen. Daarom zijn in deze studie nieuwe indicatoren ontwikkeld om deze veranderingen wel weer te geven. De ambitie is om te verklaren waarom

sommige institutionele hervormingen in sommige landen tot een beter resultaat hebben geleid dan in andere landen. Met behulp van zeven blokken van vijf jaar en achttien OESO landen is enige ondersteuning gevonden voor de interactie hypothese. Echter, er wordt ook aangetoond dat sommige institutionele hervormingen tot een beter resultaat hebben geleid dan anderen ongeacht het initiële raamwerk. Als gevolg daarvan kan er op basis van de schattingen in hoofdstuk 2 worden gesteld dat de meeste OESO landen een betere arbeidsmarktprestatie zouden hebben neergezet wanneer ze dezelfde hervormingen zouden hebben geïmplementeerd als in Nederland of het Verenigd Koninkrijk.

Hoofdstuk 3 onderzoekt de politieke steun voor ontslagbescherming. Aan de ene kant vinden we de Angelsaksische landen, in het bijzonder de Verenigde Staten, die een zeer flexibele ontslagbescherming hebben (lage ontslagkosten, als die al bestaan). Aan de andere kant vinden we continentaal en zuidelijk Europa waar een verzameling van rigide regels het ontslagproces leiden. De vraag is dan waarom de politieke voorkeuren voor ontslagbescherming in de Verenigde Staten en de meeste Europese landen zo sterk van elkaar verschillen. In het model zitten drie essentiële elementen: (1) De mate van ontslagbescherming wordt bepaald door de mediane kiezer en deze kiezer heeft een baan. Met andere woorden, ontslagbescherming wordt vastgesteld op basis van meerderheidsstemmen en de meerderheid van de kiezers heeft een baan. (2) De arbeidsmarkt is gemodelleerd binnen een zogenaamd zoekmodel zodat het herverdelingsproces van arbeid benadrukt wordt. De werknemers en ondernemingen hebben tijd nodig om elkaar te vinden en ontslagbescherming vergroot de benodigde tijd. Inderdaad, wanneer het moeilijk is om een werknemer te ontslaan dan zullen werkgevers aarzelen om werknemers in de eerste plaats aan te nemen. Met andere worden, ontslagbescherming verlaagt zowel de creatie als de destructie van banen. Het wordt dan moeilijker voor een werkloze om een baan te vinden en makkelijker voor een werknemer om zijn of haar baan te behouden. (3) Migratie en ontslagbescherming zijn de (enige) twee concurrerende manieren voor werknemers om hun inkomen veilig te stellen tegen negatieve schokken. In een land met lage migratie kosten

zal de mediane kiezer eerder geneigd zijn om te kiezen voor een lage ontslagbescherming (en eenmaal werkloos dus snel een baan kunnen vinden) zodat hij snel naar de meest productieve plaats kan gaan. Op basis van deze drie elementen wordt beargumenteerd dat de essentiële karakteristieken die de Verenigde Staten onderscheidt van de Europese landen, zoals de grootte van het land en daarmee ook de economische diversiteit binnen het land en tevens de migratiekosten, het verschil in politieke voorkeuren betreffende ontslagbescherming kan verklaren. Europese landen hebben minder migratie mogelijkheden zodat de werknemers liever een veilig gestelde baan hebben, zelfs als dit betekent dat ze in lage productiviteitsgebieden blijven en eenmaal werkloos geworden langer werkloos zouden blijven. Wanneer er eenmaal ontslagbescherming is dan verlaagt dit de prikkels tot migratie nog verder hetgeen een tweezijdige relatie tussen ontslagbescherming en migratie suggereert: Mogelijkheden tot migratie bepalen de voorkeuren voor ontslagbescherming en ontslagbescherming de aantrekkelijkheid van migratie.

De vraag die behandeld wordt in hoofdstukken 4 en 5 is de volgende: is ontslagbescherming zinvol? Wederom ligt de nadruk op wetgeving met betrekking tot ontslagbescherming. Hoofdstuk 4 bekijkt het effect van ontslagbescherming op de accumulatie van menselijk kapitaal dat ontstaat voordat er tot de arbeidsmarkt toegetreden wordt. Eén conclusie van hoofdstuk 3 was dat wanneer iemand hoge migratie kosten moet dragen om de meest productieve baan te bezetten, ontslagbescherming welvaartsverhogend kan werken voor deze persoon. Hoofdstuk 4 gaat verder in op dit argument door heterogeniteit onder werknemers te introduceren. Er wordt verondersteld dat hoog opgeleide werknemers waarschijnlijk vaker geconfronteerd worden met het migratieprobleem dan laag opgeleiden. De reden is dat hoog opgeleiden vaak over gespecialiseerde kennis beschikken en de vraag naar deze kennis over tijd en ruimte varieert. Het bestaan van hoge migratiekosten zal daarom eerder de hoog opgeleiden dan de laag opgeleiden treffen. Dit ontmoedigt het investeren in gespecialiseerd menselijk kapitaal dat normaal gesproken aangeleerd wordt via tertiair onderwijs. Dit geeft ruimte voor publiek beleid. Ontslagbescherming is een mogelijkheid.

Door het verminderen van het aantal mensen dat migratiekosten zal moeten betalen, stimuleert het investeringen in gespecialiseerd menselijk kapitaal. Dit kan daarom verklaren waarom Europese landen meer publieke gelden besteden aan tertiair onderwijs dan de Verenigde Staten doet. Het zou ook weer een additionele verklaring bieden waarom de Verenigde Staten een meer flexibele werkgelegenheidswetgeving hanteert. Hoofdstuk 5 analyseert de opbrengsten van ontslagbescherming in relatie tot de kwaliteit van een werkrelatie. We zien inderdaad dat zelfs in de Verenigde Staten contracten gespecificeerd worden met betrekking tot het eventuele opbreken van het contract, met andere woorden dat de feitelijke ontslagbescherming groter is dan de wettelijke (zie Nickell en Layard (1999)). Wat dit betekent is dat zowel de onderneming als de werknemer het voordelig vinden om een contract te hebben dat hen beschermt tegen negatieve schokken. Waarom dit zo is, is het onderwerp van hoofdstuk 5. Ontslagbescherming is een manier voor de onderneming om zich vast te binden aan de belofte om de werknemer niet te ontslaan wanneer er negatieve schokken plaatsvinden. In zekere zin is het ook een manier voor de werknemer om zich vast te binden aan de onderneming en geen ontslag zal nemen gedurende een negatieve schok. In ieder geval garandeert het dat de werkrelatie langer stand houdt dan zonder ontslagbescherming. Een langere werkrelatie is interessant voor de onderneming wanneer de werknemer de kwaliteit van de werkrelatie kan verbeteren door het maken van relatie-specifieke investeringen, i.e. investeringen die geen waarde hebben voor andere werkrelaties. Natuurlijk is ontslagbescherming ook een directe kost in geval van het beëindigen van het contract en ontmoedigt daardoor de creatie van banen. De conclusie van hoofdstuk 5 is dat er een optimaal niveau van ontslagbescherming bestaat in termen van welvaart. Ontslagbescherming heeft zin als men gelooft dat er relatie-specifieke investeringen gedaan kunnen worden door de werknemer die de kwaliteit van de relatie verhoogt en die niet via een contract gegarandeerd kunnen worden waar het loon aan de investeringen gekoppeld is. Bovendien laat hoofdstuk 5 zien dat dit optimaal niveau van ontslagbescherming van exogene karakteristieken van de werknemer afhangt, zoals zijn

opleidingsniveau. Het is daarom optimaal om hoog opgeleiden meer te beschermen dan laag opgeleiden. Concluderend kan er gesteld worden dat hoofdstuk 5 een dubbelzijdige relatie vindt tussen menselijk kapitaal en ontslagbescherming: ontslagbescherming heeft een positieve invloed op investeringen in menselijk kapitaal gedurende de werkrelatie en menselijk kapitaal stimuleert op zijn beurt ontslagbescherming.

De algemene boodschap van dit proefschrift is dat instituties een belangrijke rol spelen in de prestaties van de arbeidsmarkt en de welvaart van een maatschappij. Bovendien vindt er interactie tussen deze instituties plaats en interacties tussen deze instituties en essentiële karakteristieken zoals de mate van culturele en economische homogeniteit, de mobiliteitskosten binnen en tussen landen, etc. Er is daarom geen unieke duidelijke aanbeveling. Voor een goed ontwerp van een institutioneel raamwerk dienen deze interacties in beschouwing worden genomen. Ontslagbescherming is vaak verantwoordelijk gesteld voor de slechte arbeidsmarktsituatie in Europese landen. Dit proefschrift laat zien dat het ook erg waardevol kan zijn. Hoofdstukken 3 en 4 suggereren dat een goed ontwerp van de instituties afhangt van de karakteristieken van het land of het type van individuen, met andere woorden, dat ontslagbescherming bijvoorbeeld verschillend zou moeten zijn voor individuen met een verschillend opleidingsniveau.